ADDIS ABABA UNIVERSITY
School of Graduate Studies

THE IMPACT OF EU-ACP ECONOMIC PARTNERSHIP AGREEMENT (EPA) ON THE ETHIOPIAN ECONOMY: A RECURSIVE DYNAMIC CGE APPROACH

By

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Abbreviations and Acronyms

ACP	African, Caribbean and Pacific
CEEAC	Communaute Economique des Etats de l'Afrique Centrale
CEMAC	Communaute Economique et Monétaire d'Afrique Centrale
CEPLG	Communaute Economique des Pays des Grands Lacs
CGE	Computable General Equilibrium
COMESA	Common Market for Eastern and Southern Africa
EAC	East African Community
EBA	Everything But Arms
ECA	Economic Commission for Africa
ECOWAS	Economic Commission for West Africa
EPA	Economic Partnership Agreements
EU	European Union
FTA	Free Trade Area
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
IGAD	Intergovernmental Authority for Development
IOC	Indian Ocean Commission
LDCs	Less Developed Countries
MARU	Mano River Union
OAU	Organization of African Union
RIAs	Regional Integration Arrangements
SACU	Southern African Customs Union
SADC	Southern African Development Community
SAM	Social Accounting Matrix
UMA	Union du Maghreb Arab
UMEOA	Union Economique et Monétaire Ouest Africaine
UUEMOA	Union Economique et Monétaire Ouest-Africaine
WTO	World Trade Organization

Abstract

Regional integration arrangements are becoming the fashion of the day. Being part of these arrangements, Economic Partnership Agreements (EPAs) are being undertaken between EU and ACP countries. The impact on Ethiopia's economy taking in to account the strategic sectors, however, has not been studied. This paper tried to fill this gap by using a Dynamic Recursive CGE model.

To investigate the impact of EPA on the Ethiopian economy, four simulation scenarios are examined. The scenarios involve joining EPA at one time, in 2011, or through phases, a 20% tariff removal each year from 2011-2015. Another scenario involves excluding strategic sectors from the EPA.

The impact of EPA has been found to be significant on traded commodities. Particularly, the price of machineries, vehicles and equipments will decrease. Government revenue also decreases as tariff revenue is an important source of revenue for the Ethiopian government. GDP and trade balance are, however, positively affected. The increase in GDP might be associated to the increase in disaggregated production. The larger increase in exports as compared to the increase in imports leads to an improvement in trade balance. Private consumption also increases. This might be due to the availability of cheap consumption commodities from abroad due to the removal of tariff. On the other hand, our results show a decrease in investment which might be attributed to the inability of domestic producers to compete with foreign suppliers at a lower price.

Our findings also show that protection of strategic sectors benefits only producers in these sectors. Exclusion of strategic sectors from EPA helps producers face less competition as the price of imported commodities will include tariffs. Protection of strategic sectors will also increase government revenue. The impact of protecting strategic sectors on the overall economy, however, is negative. It results in a decrease in GDP as well as deterioration of trade balance.

Keywords: Regional integration, Recursive dynamic CGE, EPA, Ethiopia

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Chapter One

Introduction

1.1 Background

Currently, countries in our world are becoming highly interdependent. The economy of a country is highly dependent on the economy of other countries. Taking this in to account, cooperation in economic aspects is becoming the fashion of the day. One of the mechanisms of cooperation used is trade agreements.

Trade agreements, both bilateral and multilateral are seen as best instruments to facilitate trade between and/or among signatory countries and thus reap the benefit of trade (Asante, 1997). Both developed and developing countries use different types of trade agreements. Being one of these trade agreements, regional integration has prospered in the last three decades (Venables, 2007).

Simply defined as groupings of countries formed with the objective of reducing barriers to trade between members, regional integration as a concept was developed in the 1950s following the creation of the European Communities (Asante (1997); Venables (2000); Lyakurwa (1997)). An increasingly significant amount of the world trade is conducted within regional integration agreements (RIAs). Estimates show that more than half of total world trade occurs through RIAs and these trade grew from 43% to 60% of the total between 2001 and 2005 (OECD, 2005).

Africa started regional integration when the states began unifying against imperialism and colonialism (Asante, 1997:32). Asante stated that regional integration was recognized as essential component of strategies of economic decolonization long before the attainment of political independence (Ibid, 32). At the first two post colonial meetings in April 1958 and in June 1960, African leaders adopted regionalism as a vehicle for overcoming the economic

constraints imposed by the smallness and fragmentation of national markets. At the inaugural meeting of the OAU in May 1963, regionalism was enshrined in the OAU charter (Lyakurwa, 1997). After independence, regional integration still remains to be the key strategy for African governments to accelerate the transformation of their fragmented small economies, expand their markets, widen the region‘s economic space, and reap the benefits of economies scale for production and trade, there by maximizing the welfare of their nations (ECA, 2010).

Including the Union du Maghreb (UMA) in the North and Southern Africa Development Community (SADC) in the South, currently there are about 14 regional integration arrangements in Africa[1], in which eight of them are regional economic communities and the remaining six are inter-governmental organizations.

Despite these formations, regional integration arrangements among countries in developing world in general and in Africa in particular have been a failure story. Regional integration among developed countries, on the other hand, has been successful with the typical example being the European Union (Lyakurwa, 1997). Due to this, developing countries are now changing their attitude towards forming RTAs with developed countries. This has led to the formation of regional integration between developed and developing countries as well as unilateral actions taken by developed countries to help the economies of developing countries. The North American Free Trade Arrangement (NAFTA), and African, Pacific and Caribbean (APC)-European Union (EU) economic partnership agreements (EPA) are typical examples for this.

[1] Source: http://www.wto.org/english/tratop_e/region_e/summary_e.xls.

1.2 Statement of the Problem

With the view that free trade promotes economic welfare, most industrial and developing countries in the world are becoming members of regional integration.[2] Many countries are also considering RIAs as one of the main policy issues (De Melo and Panagariya, 1993). Both the developed and developing countries are joining RIAs. With failure of RTAs among developing countries, attention now has changed to those RTAs among developed countries, and between developed and developing countries.

The Lome Convention, a multilateral trade and aid agreement signed in 1975 between the European Economic Community (EEC) and 46 African, Caribbean and Pacific (ACP) States is one of the economic partnership agreements signed between developed and developing countries (Lecomte, 2001 and Vollmer et al, 2009). From 1975 to 2000, the EU has granted a preferential trade regime to ACP nations within the framework of Lome co-operation agreements (Lecomte, 2001). In this period, consecutive Lome Conventions was signed between EU and ACP countries.

Lome trade preferences granted non-reciprocal advantages to ACP products imported into Europe in relation to competing products from other countries (Ibid). However, in the year 2000, the EU decided to end the Lome conventions after eight years. Being the successor of the Lome Conventions, the Cotonou Agreement was signed in June 2000 and preferences were extended for eight more years (until the beginning of 2008) for all countries of sub-Saharan Africa, except South Africa, as well as most independent developing countries in the Pacific and the Caribbean (see the list of ACP countries in Table 3.8). The major reason given for the termination of the non-reciprocal Lome Conventions is their incompatibility with WTO rules. Preferences infringe

[2] Of course, today many countries are members of more than one regional integration arrangements. This case is common in Africa where countries join up to five regional arrangements. Detail information on Africa's multiple integration is available at: http://www.un.org/ecosocdev/geninfo/afrec/vol16n02/map.

the principle of non-discrimination established by Article I of GATT, whereby all preferences granted to one member must automatically be extended to all others. Thus, the EU had to get permission from WTO for a waiver for the eight years.

Under the Cotonou Agreement, Economic Partnership Agreements (EPAs) will be established between the EU and the ACP countries. EPAs define a new stage in the policy of the EU towards the ACP developing countries by establishing a framework which is fully compatible with the WTO trading rules, in the sense of GATT Article XXIV[3]. The aim of EPAs is establishing free trade areas (FTA) between EU and ACP countries.

When the Cotonou agreement came to an end in January 2008, some of the countries including Ethiopia did not join the EPA. Negotiations are still going for those countries who did not sign. To facilitate this, the ACP countries are grouped in to six.

With the negotiations going, economic analyses are being conducted to assess the possible impact of EPA on ACP countries. For the Ethiopian case, for example, different studies have been conducted. Up to the researcher‘s knowledge, studies on the impact of EPA on the Ethiopian economy, however, are not enough. Those existing studies also are not without limitations. Ermias (2009) investigated the impact of EU-ACP EPA on the Ethiopian economy considering the liberalization of agricultural sector only and found no significant impact on the economy. He considered only agricultural liberalization and ignored strategic sectors. Another study by Hamouda et al (2006) found that there will be significant trade diversion from other African countries to EU as well as significant government revenue loss. In their analysis, they used the WITS Smart model which is different from the methodology used by this paper. Currently, recursive dynamic CGE models are believed to the dominant models for analyzing

[3] GATT Article XXIV (24) requires regional agreements between WTO members to be reciprocal (Abregoa, Riezmanb and Whalley, 2006).

policies which have impact on the whole economy. Thus there are gaps between what should be done and what is actually done.

This paper is supposed to fill these gaps. In general, as Abregoa, Riezmanb and Whalley (2006) correctly stated, no set of generally accepted propositions regarding the effects of regional trade agreements has yet emerged to guide policy makers and public officials, and as a result, a continued work on RIAs, like this one, is still necessary.

Thus, a study investigating the impact of EU-ACP economic partnership agreements on the overall economy using dynamic recursive CGE model is important. Particularly, the 2005/06 Ethiopian SAM prepared by EDRI will be very important source of data for such analysis. This study is conducted with the intention of investigating economy wide impact of EU-ACP EPA on Ethiopia using the 2005/06 Ethiopian SAM.

1.3 Objectives of the study

The main objective of the paper is to provide quantitative estimates of the likely impact of EU-ACP EPA on the Ethiopian economy. The specific objectives are:

(a) The likely gains (or losses) in government revenue as a result of the EPA,

(b) The effects on the Ethiopian macro economy accounts such as GDP, Exports, Imports, Investment and Private Consumption,

(c) The impact on households, such as changes in quantity consumed and consumption expenditure.

1.4 Significance of the Study

Trade policy is one of the key issues policy makers face. Decision has to be made whether to liberalize trade and join economic agreements like the EU-ACP EPA. Analysis on trade liberalization including the impact of joining economic partnership agreements will thus have

paramount importance. This study is a piece on this line. It will serve policy makers as a reference in making decision on EU-ACP EPA.

1.5 Hypothesis of the Study

The study hypothesizes that since joining EU-ACP EPA is in line with free trade, it will increase the benefit of member countries in general and that of Ethiopia in particular. It is expected to bring an increase in GDP, improvement household consumption, and decrease in government revenue.

1.6 Scope of the Study

The study is limited to the economic analysis of joining AU-ACP EPA for Ethiopia.

1.7 Organization of the Study

The paper is organized in six chapters. Chapter one is the introduction part which includes background, statement of the problem, objectives, significance, hypothesis and scope of the study. Chapter two reviews both the theoretical and empirical literature. Chapter three highlights Ethiopian economy from a SAM perspective and also discusses the trade relation among ACP-EU countries. Chapter four presents detailed explanation of the methodology used in the study. Chapter five presents simulation results. The last chapter, chapter six, will have conclusion and policy recommendations.

Chapter Two

Literature Review

2.1 Theoretical Review

2.1.1 Definition of Terms

Regional integration arrangements (RIAs), in general, are mechanisms where countries together form free trade areas or customs union, offering the members preferential trade access to each others' markets' (Venables, 2000). The preferential trade access depends on the depth of the integration arrangement. Some RIAs could be shallow and others could be deep. Shallow integration involves the lowering or removal of barriers to the movement of goods and services across national borders with in the region. Deep integration, on the other hand, involves establishing or expanding the institutional environment in order to facilitate trade and location of production without regard to national borders (DeRosa, 1998).

Generally, RIAs could involve the following terms[4] . *Preferential tariff agreement (PTA)* is one of the simplest forms of RTAs. Under this arrangement, custom duties on trade among member countries are *reduced* relative to those on trade with non member countries. If member countries agree not only to reduce but to *remove* any custom duty on trade with one another while retaining their own decision on trade with non member countries, the RIA will become the so called *free trade area (FTA).* In this arrangement, rules of origin will work. On the other hand, a customs union (CU) is an FTA with common external tariff (CET) on trade with non-member countries. In this arrangement, there is no requirement for rules of origin.

RTAs could also take the form where a country adopts non-discriminatory reduction in trade barriers. This is the type of arrangement commonly known as *unilateral trade liberalization*

[4] The discussion is based on Lyakurwa et al (1997).

(UTL). A *common market* is another type of RTA which also allows free movement of factors of production in addition to the formation of a customs union. If the common market further includes the coordination of major economic policies, such as, fiscal and monetary, it is known as an *economic union.* At the height of all RIAs is a political union which represents the ultimate stage of economic and political integration in which the legislative and judicial process of member states are either unified or federated under consensually agreed arrangements.

2.1.2. Theoretical Developments in Regional Integration Arrangements

2.1.2.1. Basic Viner Model

Economic analysis of regional integration traces its origin back to the seminal work of Jacob Viner whose 1950 article entitled *the customs union issue* introduced the concepts of trade creation and trade diversion effects (Lipsey, 1960, Nicholis, 1998). Trade creation refers to the replacement of relatively high cost domestic production with lower-cost imports from the partner country while trade diversion refers to a switch in imports from a more efficient producer country in the rest of the world to a less efficient partner country (Nicholis, 1998).

Viner‘s model of customs union is a partial equilibrium model with constant costs of production. According to Viner, patterns of trade will change as a result of a customs union formation. The removal of tariff on commodities traded between or among members will artificially change the price of those traded commodities.

According to the basic Vinerian model, the benefit of a customs union is evaluated based on the net effect of trade creation and trade diversion. Trade creation is benefit of a customs union while trade diversion is a loss. In other words, trade creation enhances overall efficiency in the customs union while trade diversion reduces it. If trade creation is greater than trade diversion, the customs union will result in an increase in the combined welfare of member countries. On the

other hand, if trade diversion is greater than trade creation, then the combined welfare of members will decrease and thus the formation of the customs union is not recommended.

Unfortunately, the partial equilibrium model of Viner does not tell us anything about the net effect. It is ambiguous to decide the welfare effects of a customs union.[5] The Vinerian approach is also criticized for being static.

2.1.2.2 Viner Model with Increasing Costs of Production

Economists do not find the assumption of constant costs of production appropriate particularly in circumstances where individual countries and small groups of countries have limited natural resource base as well as limited productive endowments in comparison to the rest of the world (DeRosa, 1998). Thus, they developed the basic Viner model with increasing costs of production in countries forming a customs union while non members are still assumed to have constant costs of production[6].

The formation of customs union will lead to both trade diversion and trade creation like the basic Viner model. But the magnitude differs. Since countries forming a customs union are facing increasing costs of production, they might not be able to meet the import demands of other members created due to the formation of free trade or customs union. This implies that trade with non member countries still exists and the amount of trade creation, if any, will be lower.

Compared to the basic Viner model with constant cost of production, this model is trade diverting on a net basis and thus welfare is decreasing.

2.1.2.3 Modern Static Theory of Regional Integration Arrangements

The previous basic Viner model and its extension with increasing costs of production are partial equilibrium models which ignore interrelationships among markets for goods and factors of

[5] Pomfret (1986) labeled customs union theory as one of the most disappointing branches of post war economics.
[6] This implies that the home country and the partner country are both price-takers in world markets.

production throughout an economy. Besides, those two models are best suited for the analysis of regional integration arrangements among small number of countries with the assumption that commodities are consumed in fixed proportion independent of the structure of relative price (Lipsey, 1960). This brings the need for models of regional integration which will enable us to consider: ‗simultaneous adjustment of interrelated markets for goods and factors of production in trading countries, substitution of goods in demand and supply, and possible international terms of trade effects impinging significantly on trade and economic welfare in individual countries and the world at large' (DeRosa, 1998).

The modern static theory of regional integration addresses all the above issues. One of the pioneers of this theory is J.E. Meade in 1995 (Lipsey, 1960 and Gehrels, 1956). Meade's analysis focused on the role played by prices, international terms of trade, and economic welfare of the world economy. Meade also contributed to the introduction of the theory of the second best in regional integration. The theory of second best states that in circumstances where markets are not working properly, ‗a government intervention that appears to distort incentives in one market may actually increase welfare by offsetting the consequences of market failure elsewhere' (Krugman and Obstfeld, 2003). In fact, the theory also states that government intervention might also decrease welfare. In regional integration, this implies that it is difficult to say that removal of tariff improves the welfare of member countries.

2.1.3 Costs and Benefits of Regional Integration

Starting from the works of Adam Smith and David Ricardo, economic theory tells us that international trade is welfare improving. According to Adam Smith, countries could specialize in the production of commodities which they have absolute advantage than others. Different countries having absolute advantage in the production of different commodities could enter in to

exchange and maximize their welfare rather than producing commodities which they lack absolute advantage in production. This theory, however, states that a country should have absolute advantage in the production of at least one commodity to trade with others. It was David Ricardo who corrected this flaw with his comparative advantage theory. Accordingly, a country does not need to be a least cost producer of a commodity. A lower opportunity cost will help the country to specialize in the production of the commodity and hence can exchange it with others. Regional integration, being part of international trade, was originally supported with this theoretical background. That is, regional integration is believed to be a move towards free trade (Alemayehu and Haile, 2007).

With this background, let us see the impact that a regional integration agreement will have on the member country. Removal of trade barriers on trade with regional partners will, in general, bring the following changes: change in prices faced by domestic firms and consumers, change in world prices (for large countries), and change in the volume of imports and exports to and from the partner countries to the rest of the world (Baldwin, 1993)[7]. Baldwin further explained that liberalization may change the amount of rents earned by domestic imperfectly competitive firms, change the exploitation of scale economies by domestic firms, change the variety of goods available, and lead to various growth effects. Accordingly, the total effects can be summarized as follows:

Welfare Change = (terms of trade) + (volume of trade) + (trade rents)

+ (pure profit) + (scale) + (variety)

+ (Capital formation) – (forgone consumption)

+ (technological spillovers)

[7]This section is mainly dependent on Baldwin's work.

2.1.3.1 Allocation Effects

From the above equation, the first two rows of the effects involve resource reallocation and as a result they are called allocation effects. Particularly, the changes in terms of trade, volume of trade and trade rents are impacts which occur when one assumes perfect competition and constant returns to scale. The remaining three, that is, the changes on pure profit, scale, and variety are effects possible under imperfect competition and increasing returns to scale.

To analyze the welfare effects of a unilateral trade barrier reduction in competitive industries, assume the country is small and as a result its demand will not affect world price. That is, the country faces a perfectly elastic world supply curve. Trade barriers artificially distort the price of imported goods relative to domestic goods. The famous analysis in this respect is tariff.

The removal of tariff will have the following impact. First, it will reduce the price of domestically produced commodities. Second, this price fall will discourage domestic producers and will lead to the reduction of domestic production. Third, the lower price will encourage domestic consumers to increase their consumption. Fourth, higher domestic consumption will be met by higher imports as domestic production falls. Imports will increase. The overall economy impact of tariff removal is the sum of its impact on firms, consumers and the government. Government and firms are losers while consumers are beneficiaries. The analysis here is on the net basis and we have to add the gain and loss.

The other type of barrier is geographically discriminatory barrier. This is the common case in the formation of RIAs. Consider for example Ethiopia is forming a RIA with Kenya. Suppose that the RIA gives Kenya the advantage of facing lower trade barriers while another country, say, Egypt could not get. Such arrangements usually create what Viner called trade diversion and trade creation effects. When an importer from Ethiopia decides to buy the same product from

these two countries, she/he will not merely see which one is the least cost producer. Rather she/he will take the higher tariff against Egyptian products in to account. The tariff levied on Egyptian products may be large enough to force the importer to buy from Kenya even if Egypt could be the low cost producer.

2.1.3.2 Location Effects

Regional integration affects the location of industrial concentration. According to Paul Krugman and Tony Venables, location of industries is determined by two economic factors: increasing returns to scale in production and trade costs.[8] Increasing returns to scale refers to reduction in average cost of production as the scale of production increases. Trade costs include all the necessary outlays to deliver the product from the factory to the users. Trade barriers are an important part of trade costs.

According to Krugman-Venables theory increasing returns to scale forces firms to concentrate production in one area. Trade costs, however, force them to do the opposite. Regional integration reduces trade barriers which lead to a reduction in trade costs for firms. Firms will concentrate their production. This will benefit countries where firms are concentrated.

2.1.3.3 Accumulation (Growth) Effects

It is widely believed that capital accumulation is an engine of growth (Baldwin, 1998). Macroeconomics theory tells us that growth is the result of accumulation of factors of production mainly capital, including both physical and human capital. The impact of RIAs on growth, thus, comes through their impact on the accumulation of factors of production.

Growth effects could be either medium term or long term. Regional integration improves the efficiency with which productive factors are combined to produce output. As a side effect, this efficiency gain makes the region a better place to invest, so more investment occurs. The result is

[8] Their theory is known as Krugman-Venable theory. Krugman and Venables as quoted by Baldwin (1993).

that the initial efficiency gains are boosted by induced capital formation. While the above normal capital formation is occurring, the economies experience a medium term growth effects; it is only medium term because it will eventually peter out. As the amount of capital per worker rises, the marginal incentive to invest in more capital diminishes and eventually the above normal capital formation stops. A good example of this is the investment boom that Spain experienced around the time of its accession to the EU.

Long term growth effects involve a permanent change in the rate of accumulation, and there by a permanent change in the rate of growth. In the long run, the growth effects of trade arrangement is brought by increase in market size, increase in competition, knowledge spillover effects, innovation and international capital market integration, comparative advantage in R&D etc.

2.2 Empirical Review

2.2.1 Historical Origins of Regional Integration

Cooperation between countries for the mutual benefit of their people dates back to ancient times. The cooperation might be between two countries, also known as bilateral or among many countries, mostly with geographical proximity, which is also known as regional agreement. It might also involve agreements to be applied all over the world. This type of agreement is known as multilateral agreement. Bilateral and regional agreements are discriminatory while multilateralism involves the application of non-discriminatory policies (DeRosa, 1997).

In modern times, regionalism and bilateralism have a longer history than multilateralism. A major agreement taken to be the beginning of regionalism is the Anglo-French commercial treaty of 1860. Accordingly, ‗France abolished all prohibitions and imposed specific duties not exceeding 30 percent of ad valorem while Britain cut the number of dutiable goods from 419 to 48 and reduced the wine tariff' (Irwin, 1993). Multilateralism, on the other hand, is a recent

phenomenon associated with the formation of General Agreement on Tariffs and Trade (GATT) in 1948 (Ibid; Solomon, 2007). GATT's main idea is expanding free trade for all countries in the world. According to J. Bhagwati (1996), GATT is the brain child of economists like Adam Smith, David Ricardo, Paul Samuelson, Kemp, Grandmont and McFadden while regionalism, particularly CUs and FTAs, are attributed to Viner, Lancaster, Lipsey and Mead. GATT is the first best scenario while regional integration is considered as the second best.

After its formation, GATT has faced several problems some of which contributed for the revival of interest in regional integration. One of these problems is the disappointment of the United States by the lack of progress at GATT negotiations and the resulting switch the country made to regionalism such as the formation of Canada-US Free-Trade Agreement (CUSTA) and North American Free Trade Agreement (NAFTA) (de Melo and Panagariya, 1993). Others also mentioned the growing tension between the United States and Japan as another problem faced by GATT (Krugman, 1993).

While GATT is in trouble, the world has witnessed the flourishing of regional agreements over the past decades (Asante, 1997) Regionalism spread worldwide after the formation of the European Economic Community (EEC) in 1957. In this so called first wave of regionalism, many free trade areas and customs union were formed all over the world.[9] In the first wave of regionalism, all regional integration schemes among developing countries were not successful (Lyakurwa et al, 1997). The European Community and FTA was the only successful regional integration scheme.

[9] The list includes European Free Trade Association (EFTA) (1960), the Latin American Free Trade Association(LAFTA) (1960), Central American Common Market (CACM) (1961), the Central African Economic and Customs Union (1964), the Association of South East Asian Nation (ASEAN) (1967), and the Caribbean Free Trade Association (1968). See Asante (1997) for details.

Many writers attributed the failure of regionalism among developing countries in this period to the policies pursued by the member countries such as import substituting strategy, restriction on factor mobility, and issues related to implementation such as failure to implement reduction in trade barriers, macroeconomic instability, and lack of strong and sustained political commitment (Ibid).

Despite the absence of economic development that regionalism was expected to bring in developing countries in the first round, regional integration schemes were again revived in the mid 1980s. Many writers believe that this revival amid the disappointing performance is due to the slow progress made in multilateral agreements of GAAT negotiations. Regionalism substituted multilateralism (Krugman, 1993). This resurrection of regional integration schemes is called the second wave of regionalism (Asante, 1997; de Melo et al, 1993).

De Melo et al (1993) argued that the second wave of regionalism differs from the first in two important aspects. First the second wave of regionalism is taking place in an environment of outward oriented policies. As we said above, the first wave of regionalism represented an extension of the import substitution industrialization strategy, which was inward looking. Second, in the first round, developing countries formed regional integration only with other developing countries. There was no regional integration formed between developing and developed countries. But in the second round of integration, developing countries are forming regional integration with developed countries. A typical example is the membership of Mexico in North American Free Trade Agreement (NAFTA) (Ibid). EU-ACP economic partnership agreements are also another example or regional integration formed between developed (European Union) and developing (African, Caribbean, and Pacific) countries. Detail on EU-ACP EPA is found in chapter 3.

2.2.2 Empirical Findings

Rapid economic growth of developing countries that opened their market to free international trade inspired the work of a large empirical literature on the impact of trade on growth (Vamvakidis, 1998; Wacziarg, 1998; Rutherford and Tarr, 1998; Montalbano, 2011). The main finding of the literature is that free trade and growth were positively correlated during the 1970s and 1980s. Trade policy openness is found to highly affect accelerated accumulation of physical capital and enhanced technological transmissions and improvements in the quality of macroeconomic policy[10].

After Viner's seminal work on Customs Union, a number of empirical works changed their attention from non-discriminatory free trade to discriminatory RIAs. Some were done to assess the performance of already formed RIAs while others were done to simulate the impacts. Gravity model have been the most common model employed to assess the patterns of bilateral trade (Foroutan and Pritchett, 1993; Elbadawi, 1997; Alemayehu and Haile, 2007; Vamvakidis, 1998)[11]. Vamvakidis (1998) and Alemayehu and Haile (2007), for example, found that regional groupings had insignificant effect on the flow of bilateral trade in Sub-Saharan Africa. Foroutan and Pritchett (1993) also supported this finding. However, Foroutan and Pritchett (1993) results do not exclude the possibility of a higher intra-Sub-Saharan Africa countries trade were the SSA countries to remove trade barriers among themselves but not with the rest of the world. Accordingly, despite the limited trade potential of SSA countries with each other at the time many of the RIAs were conceived, it is not unrealistic to think that they would have better

[10] An excellent review of the existing literature on trade openness and growth particularly for developing countries is done by Montalbano (2011).

[11] Radelet (1999) also surveyed the exiting literature on regional integration. Radelet finds that there is little reason to expect significant gains from formal trade agreements at this time.

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integrated had they truly removed trade barriers among themselves Foroutan and Pritchett (1993).

As gravity models have been commonly used for evaluation of RIAs, CGE models were used for simulation of RIAs (Ghosh, 2011). De Rosa (1997) states that CGE models are among the most important tools that both applied economists and economic theoreticians today bring to the problem of deriving useful policy guidelines on regional integration arrangements. CGE models are also commonly used for analysis of accessions to WTO.

Accordingly, the impact of many RIAs was investigated using CGE models. The results are found to be mixed: both negative and positive. Some RIAs benefit all the members while others benefit only some of the members. In fact, RIAs also have third party effects. Gosh (2002) investigated the effects of regional integration on member and non-member nations using an eight region computable general equilibrium model. Gosh found that the effects of RIAs are small in terms of benefits accruing to member nations and the loss to non-members. Existing low tariff rates due to previous WTO and unilateral negotiations are taken to be the reasons. The results also show that RIAs benefited larger countries while smaller countries lose.

Other studies show that RIAs having insignificant effect for all member countries. Urata (2003), for example, studied the impacts of East Asia FTA on foreign trade in East Asia using CGE. The findings indicate that East Asia FTA have small impacts on trade patterns in East Asia. Suk-in Chang (1997) also investigated the potential impact of regional integration between North and South Korea using a nine sector trade focused computable general equilibrium (CGE) model. Chang found that unless factor movement (labor inflow from the North and capital outflow to the same) are considered, any preferential trading system between the two Koreas has an inconsequential impact (positive or negative, aggregate or sectoral) from the view point of the

South. Hallaert (2007) supports these findings. In a paper evaluating the Impact of SADC FTA on Madagascar economy by using CGE model, Hallaert found that SADC FTA would only have a limited impact on Madagascar‘s economy. Even if Madagascar‘s trade and production would change in a way that benefits the textile and clothing sector, the gains would remain limited.

On the other hand, there are studies which found positive results in RIAs. McIntyre (2005), for example, simulated the impacts of EAC for Kenya. His results indicate that the customs union will have a beneficial effect on Kenya‘s trade. Hedi Bchir et al (2006) also estimated the impact of the integration of Maghreb countries in to a free trade area on the main macroeconomic aggregates. By using the MIRAGE model and Mac Map data base, they tested different scenarios to estimate the gains or the potential losses of various plans of trade integration (Free Trade for the Maghreb countries, Customs Union between Maghreb countries, Maghreb Common Market). Their study suggests that the overall gains from librating trade in goods (and removing various regulatory non-tariff barriers in the process) could reach at least USD 350 million. The increase in revenue, through increases in production and wages, would positively affect welfare levels for Maghreb consumers. Their analysis shows that the creation of a common market is probably the most interesting and efficient option for the Maghreb countries.

There are also many studies assessing the potential impact of EU-ACP EPA. Fontagne, Mitaritonna, and Laborde (2008) studied the impact of EU-ACP EPAs in the six regions while Borrmann, Busse, and Rocha (2008) studied for East and Southern African (ESA) countries. Fontagne, Mitaritonna, and Laborde (2008) found a 20.7% increase in the volume of ACP exports to the EU in 2022 under. They also found an increase in imports from EU by 17%. This implies an improvement in trade balance. The highest increase in imports is found to be in Caribbean (27%) and the lowest in SADC (11%). The study also investigated loss of tariff

revenue on EU imports for all ACP to be 71%. Borrmann, Busse, and Rocha (2008) also found a significant budget deficit for ESA countries and moderate trade effects.

Vollmer et al (2009) studied the impact of EU-ACP EPA for 9 African countries: Botswana, Cameron, Cote d‘ Ivoire, Ghana, Kenya, Mozambique, Namibia, Tanzania, and Uganda. Their results indicate that Botswana, Cameron, Mozambique, and Namibia will be highly beneficial while the trade benefits for Ghana, Kenya, Tanzania, Uganda, and Cote d‘Ivoire are close to zero.

Another study conducted by Adenikinju and Alaba (2005) investigated the impact of EPA on Nigeria. They found an increase in imports, exports and consumption while Real GDP, investment and government revenue decreases.

Some studies also investigated the impact of EPA on the Ethiopian economy. Hamouda et al (2006) found that there will be significant trade diversion from other African countries to EU. Their results also further indicated the existence of more trade effects as a result of liberalization in industrial sector than liberalization in agricultural sector. The loss in government revenue is also found to be more pronounced in the industrial liberalization. These findings are supported by Zewde and associates (2011). Using a recursive dynamic CGE model, Ermias (2009) analyzed the impact agricultural sector liberalization on the whole economy. His findings show that there is no significant change in the economy by liberalizing the agriculture sector only. According to his findings, the EPA leads to a decrease in productivity in agricultural sector, real GDP, total investment, government revenue and returns to factors of production. Domestic producers in the agriculture sector are negatively affected while producers in the non agricultural sector and domestic producers are beneficiaries.

Chapter Three

Ethiopian Economy and EU-ACP Economic Partnership Agreement

3.1 General Overview of Ethiopia's Economy from a SAM Perspective

In this section, we will describe the Ethiopian economy using the 2005/06 Ethiopian SAM which is also the main source of data for the analysis of the paper[12].

3.1.1 Value Added

Total value added represents the earnings received by factors of production, such as employee compensation and gross operating services (EDRI, 2009). This value is also known as Gross Domestic Product at factor cost, GDPFC. Appendix 1shows Value added at factor cost in Billion Birr. In 2005/2006, 1998 Ethiopian Fiscal Year, GDPFC was 122.22 billion birr. 58.74 billion birr of this amount is contributed by agriculture and related activities. This is the largest contribution by a single sector. It accounted for 48.1 percent of the total GDPFC. It shows that the Ethiopian economy is agrarian.

The share of GDP generated by sectors is given in table 3.1 below. Services are the second dominant sector in the economy with a total amount of 49.44 billion birr, which is 40.4 percent of GDPFC. Whole sale and retail contributed the largest share in services with a total amount of 13.85 billion birr, which is 11.3% of the total GDPFC, while transport and communication is the second with 6.36 billion birr, or 5.2%. Industry has the lowest share of GDPFC with a value of 14.04 billion birr. This is equivalent to 11.5 percent. Manufacturing sub-sector contributed 5.75 billion birr, which is 4.7 percent of total GDPFC and other industries contributed 8.29 billion birr, or 6.8 percent of total GDFC.

[12] The description of Ethiopian Economy in the Ethiopian Fiscal Year 1998 (2005/2006) is adopted from EDRI: Ethiopia Input Output Table and Social Accounting Matrix, 2009.

Table 3.1 share of GDP generated by sectors

Sectors	Factors							Sector Value-added at Factor Cost
	Total Labor	Agriculture Labor	Non-agriculture Labor	Total Capital-Land	Agriculture Capital-Land	Livestock Capital	Non-agriculture Capital-Land	
Agriculture & Related Activities	**73.5%**	**100.0%**	**0.5%**	**23.3%**	**100.0%**	**100.0%**	**1.1%**	**48.1%**
Cereals	23.1%	31.4%	0.1%	4.8%	35.2%	0.0%	0.0%	13.8%
Cash Crops	7.2%	9.8%	0.0%	5.2%	38.1%	0.0%	0.0%	6.2%
Livestock	20.1%	27.4%	0.2%	8.8%	0.0%	100.0%	0.0%	14.4%
Other Agricultural Activities	23.1%	31.4%	0.1%	4.5%	26.7%	0.0%	1.1%	13.7%
Manufacturing	**4.0%**	**0.0%**	**14.8%**	**5.4%**	**0.0%**	**0.0%**	**7.0%**	**4.7%**
Milling Services (Small Scale)	0.2%	0.0%	0.8%	0.6%	0.0%	0.0%	0.8%	0.4%
Food Processing	1.5%	0.0%	5.5%	2.2%	0.0%	0.0%	2.9%	1.9%
Other Manufacturing Activities	2.3%	0.0%	8.6%	2.6%	0.0%	0.0%	3.3%	2.4%
Other Industries	**3.7%**	**0.0%**	**13.8%**	**9.8%**	**0.0%**	**0.0%**	**12.7%**	**6.8%**
Utility	1.1%	0.0%	4.1%	2.6%	0.0%	0.0%	3.4%	1.9%
Mining & Quarrying	0.3%	0.0%	1.2%	0.8%	0.0%	0.0%	1.0%	0.5%
Construction	2.3%	0.0%	8.5%	6.4%	0.0%	0.0%	8.3%	4.4%
Services	**18.9%**	**0.0%**	**70.9%**	**61.4%**	**0.0%**	**0.0%**	**79.2%**	**40.4%**
Wholesale & Retail Trade	4.7%	0.0%	17.8%	17.8%	0.0%	0.0%	22.9%	11.3%
Transport & Communication	1.0%	0.0%	3.8%	9.3%	0.0%	0.0%	12.0%	5.2%
Hotels & Restaurants	2.1%	0.0%	8.0%	2.0%	0.0%	0.0%	2.6%	2.1%
Financial Services	0.6%	0.0%	2.1%	3.1%	0.0%	0.0%	4.0%	1.9%
Real Estate	0.1%	0.0%	0.3%	15.5%	0.0%	0.0%	20.0%	7.9%
Public Administration	3.1%	0.0%	11.6%	6.6%	0.0%	0.0%	8.5%	4.9%
Education	3.3%	0.0%	12.4%	3.7%	0.0%	0.0%	4.8%	3.5%
Health	0.9%	0.0%	3.4%	0.8%	0.0%	0.0%	1.1%	0.9%
Other Service Activities	3.1%	0.0%	11.6%	2.5%	0.0%	0.0%	3.3%	2.8%
Total Value-added at Factor Cost	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

(Source: EDRI, 2009)

3.1.2 Trade Shares

The 2005/2006 Ethiopian SAM shows that the country mainly exports primary commodities. The total export earnings of the country amounted to 16.77 billion birr. 6.88 billion birr, which is equivalent to 41 percent of the total export earnings, is obtained from primary agricultural products (EDRI, 2009). Earnings from transport services contributed the second largest amount with 4.61 billion birr, which is 27.5 percent. On the other hand, the major import items of the country are machineries, transport, electronic and other equipment, petroleum products, Chemicals, rubbers and plastic products, and metals and metal products. Imports of machineries, transport, electronic and other equipment amounted to 12.62 billion birr, which is 26.8 percent of the total. The country also paid 5.69 billion birr for petroleum products, and 4.46 billion birr for chemicals, rubbers and plastic products.

Table 3.2: Structure of Trade values in billion birr

Goods & Services	Exports of Goods & Services	Shares in total Exports	Gross Domestic Output	Imports of Goods & Services	Shares in Total Imports	Total Demand
Primary Agricultural Products	6.88	41.0%	53.79	2.22	4.7%	63.33
Processed Food Products	0.90	5.4%	15.53	1.50	3.2%	19.62
Tobacco and Beverage Products	0.19	1.1%	2.21	0.23	0.5%	4.60
Textile and leather products	0.68	4.1%	3.62	2.21	4.7%	8.60
Wood and paper products	0.08	0.5%	0.81	1.02	2.25%	2.40
Minerals and mineral products	0.01	0.0%	1.90	0.35	0.7%	3.81
Petroleum products				5.69	12.1%	8.28
Fertilizers				1.30	2.8%	1.80
Chemicals, rubbers and Plastic products	0.32	1.9%	1.60	4.46	9.5%	9.09
Metals and metal products	0.57	3.4%	1.97	4.01	8.5%	9.40
Machinery, transport, electronic &other equipment	0.39	2.3%	2.31	12.6	26.8%	20.47
Electricity, water & communication services	0.56	3.3%	4.71	0.31	0.7%	5.22
Trade &repair services	0.34	2.0%	25.75	0.08	0.2%	26.22
Hotel &restaurant services	0.40	2.4%	8.02	0.48	1.0%	8.61
Transport services	4.61	27.5%	8.69	8.04	17.1%	16.73
Financial services	0.24	1.4%	3.47	0.57	1.2%	4.05
Construction, real estate & rental services	0.10	0.65	32.10	0.03	0.1%	32.41
Public, social &other business services	0.51	3.1%	20.69	1.86	4.0%	22.78
Total	16.77	100.00%	187.18	47.0	100.00%	267.40

(Source: EDRI, 2009)

Table 3.3 also shows that Ethiopia runs a trade deficit of 30.24 percent in 2005/2006. Using the ratio of total trade (imports plus exports) to GDPMP, GDP at market prices, we can calculate whether the country has open economy. Accordingly, Ethiopia is moderately an open economy with trade having a value of half of GDP at market prices.

Table 3.3: Trade Related Indicators Values in billion birr

Other Trade Indicators	Ratios & Values
Trade Surplus (Deficit)	30.24
Trade Deficit as a share of GDP	22.8%
Openness of the Economy	
Total trade	63.78
Trade to GDP Ratio	48.2%
GDP at Market Prices	132.22

(Source: EDRI, 2009)

3.1.3 The structure of Demand

In 2005/2006, total final demand was 179.33 billion birr (EDRI, 2009). Total private consumption is the dominant component of final demand with 114.75 billion birr, which is 60.4 percent, followed by private investment with an amount of 31.89 billion birr, which is 17.8 percent. Government consumption had the lowest share with a total amount 15.91 billion birr, or 8.9 percent.

Table 3.4 Demand for Goods & Services by Users in Billion birr

Goods and Services	Intermediate Demand		Household Demand	Public Demand	Investment Demand	Rest of The World	Total
	Agriculture	Non-Agriculture	Total Private Consumption	Government Consumption	Gross Capital Formation	Exports	
Intermediate Demand	6.17	58.79					64.95
Final Demand			114.75	15.91	31.89	16.77	179.33

(Source: EDRI, 2009)

3.1.4 Household Income & Expenditure

In the 2005/2006 Ethiopian SAM, households are disaggregated by residence (rural or urban) and income (poor or nor-poor) (EDRI, 2009). The following table shows distribution of household's income shares.

Table 3.5: Distribution of Households' Income Shares

Households	Factor Income					Government Transfers	Remittances from the rest of the world	Total household income
	Agriculture Labor	Agriculture Capital-land	Non-Agriculture Labor	Non-agriculture Capital-land	Total factor income			
Rural Poor	36.75	19.5%	1.7%	9.1%	19.8%	19.2%	10.0%	18.7%
Rural non-poor	63.35	80.5%	8.5%	67.9%	59.4%	20.3%	25.5%	55.0%
Urban Poor			19.5%	1.0%	3.1%	12.5%	8.0%	3.8%
Urban Non-Poor			70.3%	22.1%	17.7%	48.1%	56.5%	22.6%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Total Income by Source	33.2%	10.5%	12.1%	31.2%	87.0%	1.2%	11.9%	100.00%

(Source: EDRI, 2009)

As shown in the table, the lion's share of agricultural labor income is taken by rural non-poor (63.3%). The share of rural non-poor income further increases to 80.5% in agriculture capital-land. Urban non-poor have the highest income share for non agricultural labor factor income, which is 70.3% of the total. Considering total factor income, 59.4% is taken by rural non-poor, followed by rural poor with a share of 19.8% and urban non-poor with 17.7% and urban poor with 3.1%.

3.1.5 Factor Income & Distribution

From the gross income of 122.22 billion birr in 2005/2006, 115.77 or 94.4 percent was earned by households while public enterprises earned about 6.7 billion or 5.5 percent of the total earnings (EDRI, 2009). Finally, about 210 million birr or 0.2 percent of the total was transferred out of the country in the form of investment income earned by foreigners.

Table 3.6: Factor Income and Distribution

Factor Income & Spending	Billion Birr	Shares
Factor Income		
Total value-Added at Factor Cost (GDP)	122.22	99.6%
Factor Income from RoW	0.45	0.4%
Gross National Income	**122.68**	**100%**
Factor Income Distribution		
Households	115.77	94.4%
Government Enterprises	6.69	5.5%
Investment Income to the RoW	0.21	0.2%
Total Factor Spending	**122.68**	**100.00%**

(Source: EDRI, 2009)

3.1.6 Government Budget Constraint

In (2005/06), the revenue components for the general government budget of Ethiopia were non-tax revenue, tax revenue, and transfers from the rest of the world (EDRI, 2009). The total revenue was 23.26, which is the sum of 14.15 billion birr tax revenue, 5.37 billion birr non-tax revenue and 3.73 billion birr transfers from the rest of the world. Import duties and taxes contributed 6.99 billion birr. This is the largest source of government revenue from tax.

Table 3.7: Government Revenue in Billion Birr

Government Revenue	Non-tax Revenue	Tax Revenue			Transfers from the Rest of the World	Total Revenue
		Domestic Indirect Taxes	Import Duties and Taxes	Direct Taxes		
Revenue by Source	5.37	3.11	6.99	4.05	3.73	23.26

On the other hand, total government expenditure was 17.89 billion birr. From this amount, 15.91 billion birr was used for consumption of goods and services while transfers amounted to 1.91 billion birr.

Table 3.8 General Government Recurrent Expenditure in Billion Birr

Items	Expenditures
Total Expenditures	**17.89**
Consumption of Goods & Services	15.91
Transfers	1.98
Rural Poor	0.30
Rural Non-Poor	0.31
Urban Poor	0.19
Urban Non-Poor	0.74
External Interest Payments	0.43
Government Savings/Recurrent Budget Surplus	5.37
Final Government Recurrent Expenditure	**23.26**
Gross Domestic Product at Market Prices	132.32
Recurrent Budget Surplus as a Share of GDP	4.1%

(Source: EDRI, 2009)

3.2 EU-ACP EPA

In 1975 a multilateral trade and aid agreement was signed between the European Economic Community (EEC) and 46 African, Caribbean and Pacific (ACP) countries. This agreement, commonly known as the Lome Convention, provided that products originating from ACP states shall be imported in to the EEC free of customs duties and charges having equivalent effect, and that the community shall not apply quantitative restrictions or similar measures to ACP imports. By giving unilateral discriminatory preferences to the ACP countries on the EEC market, the Lome Convention violated WTO rules. To make it WTO compatible a new convention was

needed and here comes the Cotonou Agreement. The Cotonou Agreement of 2000 paved the way for a new trading regime based on reciprocal preferences. On this basis, in 2001 the WTO agreed to give a waiver to the EU to continue providing unilateral preferences until January 2008.

Table 3.9 ACP countries by level of development

Least developed countries (LDCs)				Non-LDCs		
Africa (34)		*Caribbean (1)*	*Pacific (5)*	*Africa (14)*	*Caribbean (15)*	*Pacific (9)*
Angola	Liberia	Haiti	Kiribati	Botswana	Antigua and Barbuda	Fiji
Benin	Madagascar		Solomon Islands	Cameroon	Bahamas	Papua New Guinea
Burkina Faso	Malawi		Tuvalu	Congo-Brazzaville	Barbados	Tonga
Burundi	Mali		Vanuatu	Côte d'Ivoire	Belize	Marshall Islands
Cape Verde	Mauritania		Western Samoa	Gabon	Cuba[3]	Cook Islands
Central African Rep.	Mozambique			Ghana	Dominica	Federated States of Micronesia
Chad	Niger			Kenya	Dominican Republic	
Comoros	Rwanda			Mauritius	Grenada	Nauru
DR of Congo	Senegal[1]			Namibia	Guyana	Niue
Djibouti	Sao Tome & Principe			Nigeria	Jamaica	Palau
Equatorial Guinea	Sierra Leone			Seychelles	St Christ. And Nevis	
Eritrea	Somalia			South Africa[2]	St Lucia	
Ethiopia	Sudan			Swaziland	St Vincent & the Gr.	
Gambia	Tanzania			Zimbabwe	Surinam	
Guinea	Togo				Trinidad and Tobago	
Guinea Bissau	Uganda					
Lesotho	Zambia					

Note: 1. In 2000, the UN ECOSOC recommended that Senegal – formerly a non-LDC – be considered an LDC.
2. South Africa formally joined the ACP group in 1998, it has a separate aid and trade agreement with the EU.
3. Cuba is Member of the ACP group since 2000, but not part of the Cotonou Agreement.

(Source: Lecomte, 2001)

Under the Cotonou Agreement, Economic Partnership Agreements (EPAs) will be established between the EU and the ACP countries. EPAs define a new stage in the policy of the EU towards the ACP developing countries, establishing a framework which is fully compatible with the WTO trading rules, in the sense of GATT Article XXIV. Free trade between EU and ACP countries will exist.

When the Cotonou agreement came to an end in January 2008, some of the countries including Ethiopia did not join the EPA. Negotiations are still going for those countries who did not sign. To facilitate this, the ACP countries were initially grouped in to six. Four of the six groups are taken by African Countries. These are SADC, COMESA, ECOWAS, and CEMAC. Currently, five East African countries have pulled out of COMESA and began negotiation under the umbrella of the regional integration they formed called East African Community (EAC). Thus,

COMESA has been adjusted to Eastern and Southern African (ESA) countries. Thus, EAC is added as the seventh group.

3.2.1 Trade Relations between ACP countries and EU

Trade relations between EU and ACP are asymmetric. ACP countries imports from EU and exports to EU account a higher percentage of the total trade they undertake. For the EU, however, trade with ACP countries represents a limited share of its total trade (CEPII, 2008). Accordingly, less than 2.5% of EU imports currently come from the ACP region. The dynamics of this figure is strongly linked to the performance of the ECOWAS group, which alone accounts for half of the total EU's total imports from the whole region (Ibid, 26).

ACP countries, however, are highly dependent on the EU, largely due to the historical links between the EU and ACP countries (see Table 1). EU is an important destination for ACP exports. For the period between 1999 and 2004, for example, 29.8% of all ACP exports go to the EU. From ACP, Central Africa countries (CEMAC) have the highest percentage of their exports (37.4%) to the EU while pacific countries have the lowest percentage of their exports (15%) to the EU. EU is also an important source of imports for ACP countries. 27.9% of ACP imports came from the EU for the same period. Disaggregating the figure, CEMAC takes the lead by importing 53.5% its total imports from EU. Pacific ranks the least with 8.8% of its total imports coming from EU.

Table 3.10 - Share of ACP Exports and Imports, by region

Exports	**EU**	**ACP Same Zone**	**ACP Others Zones**	**RoW**
ECOWAS	31.90%	9.30%	1.20%	57.60%
CEMAC	37.40%	0.80%	3.20%	58.60%
COMESA	29.90%	9.20%	4.80%	56.10%
SADC	32.60%	2.10%	4.50%	60.80%
Caribbean	20.00%	8.90%	0.80%	70.30%
Pacific	15.40%	0.60%	0.50%	83.40%
All ACP	29.80%	6.70%	2.50%	61.00%
Imports	**EU**	**ACP Same Zone**	**ACP Others Zones**	**RoW**
ECOWAS	37.00%	10.50%	1.30%	51.30%
CEMAC+	53.50%	1.40%	8.20%	37.00%
COMESA	22.40%	6.40%	2.70%	68.50%
SADC	23.30%	2.50%	4.30%	69.90%
Caribbean	18.10%	5.80%	1.40%	74.60%
Pacific	8.80%	1.30%	0.80%	89.10%
All ACP	27.90%	6.70%	2.40%	63.00%

(Source: CEPII Report, 2008)

3.2.2 Trade Relation between EU and Ethiopia

EU is an important trading partner for Ethiopia. The percentage of our total exports to EU is greater than the percentage of our total imports from EU. In 2007/2008, 41% of Ethiopia‘s exports went to the EU while in 2008/2009 this figure decreased to 40.38% (MoTI). As the following table shows, EU is the largest market for Ethiopian exports. The share of our imports from EU, however, is less than the share of our exports to EU. In 2008, 18.68 percent of our imports were from EU while in 2009, it decreased to 16.08 percent (ITC).

Table 3.11 Ethiopian exports by destination

2007/2008			2008/2009	
	value in USD	shares of the total	Value in USD	shares of the total
Africa	209,291,523	14%	240,542,241.36	16.72%
Asia	519,482,539	35 %	538,452,066.49	37.43%
America	115,996,800	8%	72,289,031.21	5.03 %
European Union	609,021,022	41%	580,788,927.71	40.38%
Oceania	27,629,081	2 %	6,394,215.83	0.44 %
total	1,481,420,964	100%	1,438,466,483	100 %

(Source: MoTI)

Chapter Four

Research Design and Methodology

4.1 Computable General Equilibrium (CGE) Model

Analysis of Economic Partnership Agreements involves taking in to account the economy wide effects. The introduction of a single shock will have impact on different activities of the economy. The methodology used to analyze, thus, should be able to take this in to consideration. Computable general equilibrium (CGE) models are used for this purpose.

4.1.1 Foundations: The Circular Flow and Walrasian Equilibrium

In order to analyze the impact of a variable change on a countries' economy, we need some form of abstraction. In the words of Mankiw (2003), we need a model that explains, in general terms, how the economy is organized and how participants in the economy interact with one another (Mankiw, 2003). The circular flow diagram is such a model which presents the ‗main actors in the economy' as households and firms (Wing, 2004). As a model describing the overall activity of an economy, the circular flow diagram is also the starting point for CGE models (Ibid). In the circular flow diagram, households are owners of factors of production, which include labor, land and capital, and consumers of all the goods and services produced by firms. Firms, on the other hand, buy the factors of production owned by households and produce goods and services.

In the circular flow diagram, households and firms meet at two markets: product and factor markets. In the factor market, households are sellers of factors of production while firms are the buyers. Using these factors of production they purchased from the factor market, firms come with goods and services in the product market. Here the firms are sellers of goods and services while the households are buyers.

Equilibrium in the circular flow diagram results in the conservation[13] of product and value (Wing, 2004). Conservation of product is the physical principle which states that factors of production must be completely absorbed by firms and at the same time a commodity produced by firms must be completely absorbed by households. It is also known as material balance. It is a balance that should be kept for the flow of commodities and factors of production.

Conservation of value, on the other hand, represents the balance in the monetary value of factors of production as well as goods and service. It shows that the amount of firms‘ income is matched by the amount of households‘ expenditure and that each unit of expenditure has to purchase some amount of some type of commodity. The implication is that neither product nor value can appear out of nowhere: each activity‘s production or endowment must be matched by other‘ uses, and each activity‘s income must be balanced by others‘ expenditures. Nor can product disappear or value disappear: a transfer of purchasing power can only be effected through an opposing transfer of some positive amount of some produced good or primary factor service and vice versa‘ (Ibid:6).

Conservation of product and conservation of value are the basic foundations of Walrasian general equilibrium. Conservation of product ensures that goods produced (supplied) must be consumed (demanded), and factors of production supplied must be fully employed (demanded). This shows the existence of *market clearance* in a way that demand equals supply.

Conservation of value implies that the sum total of revenue from the production of goods must be allocated to the following purposes: as returns to households for the factors of production supplied, to other industries as payments for intermediate inputs, or to the government as taxes. The value of a unit of each commodity in the economy must then equal the sum of the values of

[13] In Physics, conservation refers to the principle by which the total value of a quantity remains constant in a system which is not subject to external influence.

all the inputs used to produce it: the cost of the inputs of intermediate materials as well as the payments to the primary factors employed in its production. The principle of conservation of value thus simultaneously reflects constancy of returns to scale in production and perfectly competitive markets for p8roduced commodities. These conditions imply that in equilibrium producers make *zero profit*.

The last principle from the Walrasian equilibrium is the *income balance*. Accordingly, the full employment of factors of production and purchase of commodities by households until their income is exhausted leads to a balanced-budget accounting.

According to Wing (2004), the above three conditions, i.e, market clearance, zero profit and income balance are employed by CGE models to solve simultaneously for the set of prices and the allocation of goods and factors that support general equilibrium. In CGE models, money is not typically represented as a commodity. However, in order to account for such trades the quantities of different commodities still need to be made comparable by denominating their values in some common unit of account. The flows are thus expressed in terms of the value of one commodity—the so-called numeraire good—whose price is taken as fixed. For this reason, CGE models only solve for relative prices' (Ibid, 8).

4.2 From a SAM to a CGE Model

4.2.1 The Basic Concept of Social Accounting Matrix (SAM)

Social Accounting Matrix (SAM) is a comprehensive, economy-wide set of accounts that quantify economic flows (incomes and expenditures) in an economy, typically representing the economy of a nation for a given period of time, usually one year (Lofgren et al, 2002). A SAM is a square matrix where the columns represent expenditure and the rows represent receipts. Each

cell shows the payment from the account of its column to the account of its row. The major principle in SAM is double entry accounting which equalizes row total (total revenue) with column total (total expenditure). This reflects the intuition that GDP (the aggregate of the components of expenditure) is equal to value added (the aggregate of the components of income). The fact that these properties are the expression of Walrasian general equilibrium makes the SAM an ideal data base from which to construct a CGE model.

SAM is an important modeling device particularly in studies involving CGE. For this reason, countries are constructing their own SAM. Ethiopia has also been constructing its own SAM. The recent of these and the first comprehensive SAM is the one developed in 2005/2006 by Ethiopian Development Research Institute (EDRI) and Institute of Development Studies (IDS), Sussex. It contains 256 separate accounts.

The major importance of SAM is enabling researchers to ~~–e~~onduct economy-wide analysis that trace the impacts of policy changes and shocks emanating from the world economy on the macro economy; the sectoral structure of production, employment, and trade; and on household income and poverty." (EDRI, 2009)

SAM is an extension of the input-output (IO) table. The IO table shows the interdependence among various sectors of the economy. Agricultural sector might purchase inputs from the industrial and service sectors while industrial could purchase inputs from service and agricultural sectors. This whole interdependence is captured by the IO table. The IO table also traces the flow of goods and services from one sector of the economy to all other sectors (inter- sectoral flows) and to itself (intra-sectoral flows). In short, the IO table summarizes the income and expenditure flows of industries.

The SAM is an extension of the IO table because it also adds elements which do not exist in the IO table, such as, government, investment and savings, and the rest of the world. These institutions do not exist in the IO table. The SAM is also more disaggregated than the IO table. For example the SAM disaggregates households in to various groups such as poor or rich and urban or rural.

Most SAMs have four major types of accounts: activities, commodities, factors of production, and institutions (households, government and the rest of the world), including an aggregate savings-investment account (EDRI, 2009).

The activity account shows the value of commodities (goods and services) produced by each activity and the cost of inputs in to each production activity consisting of intermediate input purchases along with payments to primary factors of production.

Commodity accounts show the components of total supply in value terms (domestic production, imports, indirect taxes and marketing margins) and total demand (intermediate input use, final consumption, investment demand, government consumption and exports). Factor accounts describe the sources of factor income (value added in each production activity) and how these factor payments are further distributed to the various institutions in the economy (households of different types, government and the Rest of World). Accounts for institutions record all income and expenditures of institutions, including transfers between institutions. Savings of the different institutions and investment expenditures by commodities are given in the savings-investment account.

The SAM incorporates the three macro balances: government deficit, trade deficit, and savings-investment balance. The macro balances are expressed as flows - the SAM does not include asset account - and any macro relationship in this framework will be in flow terms. In particular, the

savings-investment (S-I) account should be seen as representing the ―loanable funds" market. This account collects savings from various sources (government, private, and foreign) and spends the accumulated savings on capital goods (I). The SAM provides no information about who ―owns" the capital goods or in which sectors they are installed. Investment demand in the SAM is by sector of origin, not sector of destination, so the SAM cannot provide information about changes in sectoral capital stocks, or their valuation.

4.3 Overview of the Standard Computable General Equilibrium (CGE) Model

The standard CGE model explains all of the payments recorded in the SAM (Lofgren et al. 2002:11)[14]. The disaggregation in the CGE is similar with the disaggregation in SAM. The CGE model is a set of mainly non-linear simultaneous equations. For the overall model, there is no objective function. The non-linear equations define the behavior of different economic agents, such as, maximization of profit for producers and maximization of utility for consumers. The equations also include a set of constraints that have to be satisfied by the system as a whole but are not necessarily considered by any individual actor. These constraints cover markets (for factors and commodities) and macroeconomic aggregates (balances for Savings- Investment, the government, and the current account of the rest of the world).

CGE models are broadly divided in to two: static and dynamic. Static CGE models show one time effects of policy changes. Despite their simplicity advantage, static CGE models are unable to account for growth or second round effects (Annabi et al, 2004, and Thurlow, 2004). For example, the impact of changes in current investment on future capital is not taken in to consideration in static CGE models (Thurlow, 2004).

Dynamic CGE models are developed to solve this problem. Dynamic CGE models are again divided in to two: truly dynamic (intertemporal) and sequential dynamic (recursive) models

[14] This section mainly depends on Lofgren et al. 2002.

(Annabi, Cockburn, and Decaluwe, 2004). The basic difference between the two is the assumption on economic agents: truly dynamic models assume economic agents have perfect foresight about the future, which means they know all about the future and react to future changes in prices, while recursive dynamic CGE model assumes adaptive expectations, where economic agents are assumed to be myopic.

A recursive dynamic CGE model is a ~~–s~~eries of static CGE models that are linked between periods by an exogenous and endogenous variable updating procedure."(Ibid) capital stock is updated endogenously depending on previous outcomes while population growth and technological changes are exogenously updated. Since the recursive dynamic CGE model is a series of static CGE models, we can have both the within period (one period static) component, and the between periods (dynamic) component.

In the remaining part of this section, the main building blocks of the one period static CGE model and the between periods dynamic CGE are discussed. Detailed explanation on model sets, parameters, variables and equations is also given in the appendix.

4.3.1 The Within period Specification

4.3.1 Price Block

In the CGE model, we have many prices, primarily because of the assumed quality differences among commodities of different origins and destinations (exports, imports, and domestic outputs used domestically).

4.3.1.1 Import Price

$$PM_c = pwm_c \cdot (1 + tm_c) \cdot EXR + \sum_{c' \in CT} PQ_{c'} \cdot icm_{c'c} \qquad c \in CM \quad \text{----------(4.1)}$$

(Source: Lofgren et al, 2002)

Where,

$c \in C$ =a set of commodities (also referred to as *c.* and *C.*),

$c \in CM$ *(⊂ C)* =a set of imported commodities,

$c \in CT$ *(⊂ C)* =a set of domestic trade inputs (distribution commodities),

PMc = =import price in LCU (local-currency units) including transaction costs,

pwmc = c.i.f. import price in FCU (foreign-currency units),

tmc = import tariff rate,

EXR = exchange rate (LCU per FCU),

PWc = composite commodity price (including sales tax and transaction costs), and

icmc.c = quantity of commodity c. as trade input per imported unit of c.

The import price in LCU (Local Currency Unit) is the price paid by domestic users for imported commodities (exclusive of the sales tax). The exchange rate and the domestic import price are flexible, while the tariff rate and the world import prices are fixed. World import prices are fixed due to the assumption of small country.

4.3.1.2 Export price

$$(4.2.)PE_c = pwe_c \cdot (1 - te_c) \cdot EXR - \sum_{c' \in CT} PQ_{c'} \cdot ice_{c'c} \qquad c \in CE \text{ ----------(4.2)}$$

(Source: Lofgren et al, 2002)

Where,

$c \in CE$ *(⊂ C)* = a set of exported commodities (with domestic production),

PEc = export price (LCU),

pwec = f.o.b. export price (FCU),

tec = export tax rate,

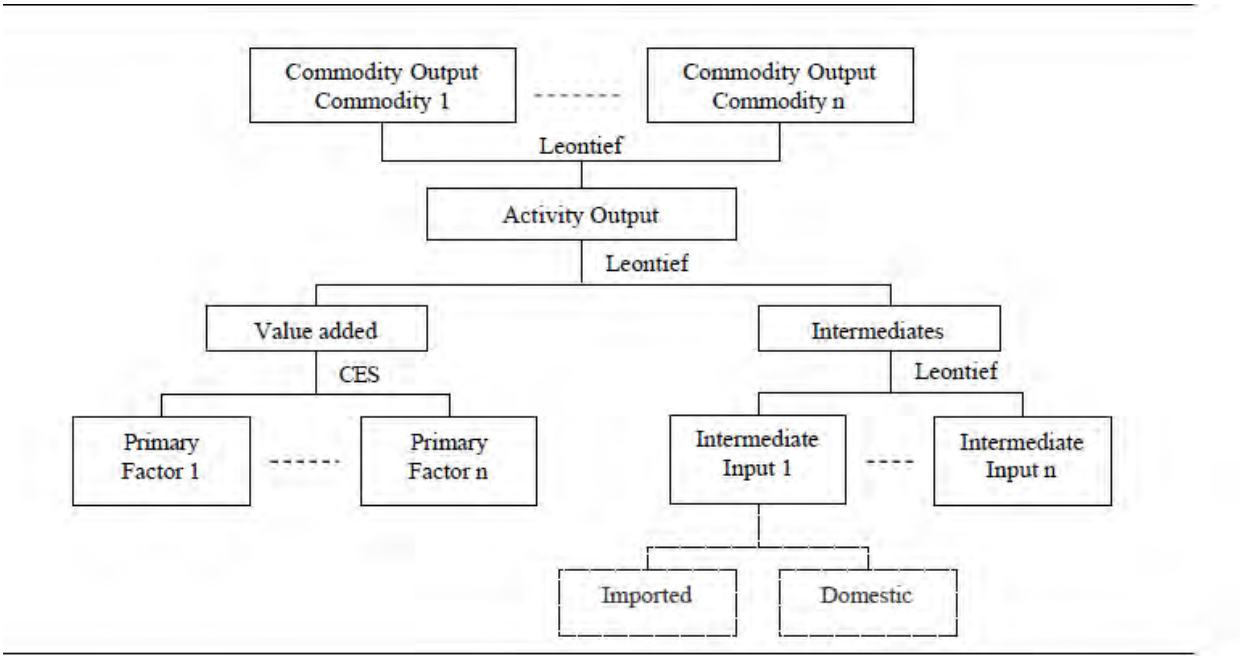
$ice_{c'c}$ = quantity of commodity *c.* as trade input per exported unit of *c*.

The export price in LCU is the price received by domestic producers when they sell their output in export markets. The main difference between import and export prices is that the tax and the cost of trade inputs reduce the price received by the domestic producers of exports (instead of adding to the price paid by domestic demanders of imports. The domain of the equation is the set of exported commodities, all of which are produced domestically.

4.3.2 Production and Trade Block

Producers are assumed to maximize profit subject to the production technology shown in the appendix. Accordingly, five factors of production are specified: unskilled labor, skilled labor, semiskilled labor, capital and land. Producers in the model maximize profit subject to constant returns to scale, with the choice between factors being governed by a constant elasticity of substitution (CES) function. CES allows smooth substitution between available factors so as to derive a final value added composite. Profit maximization implies that the factors receive income where marginal revenue equals marginal cost based on endogenous relative prices. Once determined, these factors are combined with fixed-share intermediates using a Leontief specification. The use of fixed-shares reflects the belief that the required combination of intermediates per unit of output, and the ratio of intermediates to value added, is determined by technology rather than by the decision- making of producers. The final price of an activity‘s output is derived from the price of value-added and intermediates, together with any producer taxes or subsidies that may be imposed by the government per unit of output.

Figure 4.1 Production Technology



(Source: Thurlow, 2002)

In addition to its multi-sector specification, the model also distinguishes between activities and the commodities that these activities produce. This distinction allows individual activities to produce more than a single commodity and conversely, for a single commodity to be produced by more than one activity. Fixed-shares govern the disaggregation of activity output into commodities since it is assumed that technology largely determines the production of secondary products. These commodities are supplied to the market. Mathematically, the CES technology at activity production level and at value added intermediate input ratio is given as follows:

4.3.2.1 Leontief Technology: Demand for aggregate value-added

$$QVA_a = iva_a \cdot QA_a \qquad a \in ALEO$$

4.3.2.2 Leontief Technology: Demand for aggregate intermediate input

$$QINTA_a = inla_a \cdot QA_a \qquad a \in ALEO$$

Where,

$a \in ALEO(\subset A)$ = a set of activities with a Leontief function at the top of the technology nest,

ivaa = quantity of value-added per activity unit, and

intaa = quantity of aggregate intermediate input per activity unit

Substitution possibilities exist between production for the domestic and the foreign markets. This decision of producers is governed by a constant elasticity of transformation (CET) function, which distinguishes between exported and domestic goods, and by doing so, captures any time or quality differences between the two products.

4.3.2.11 Output transformation (CET) function

$$QX_c = \alpha_c^t \cdot \left(\delta_c^t \cdot QE_c^{\rho_c^t} + (1-\delta_c^t) \cdot QD_c^{\rho_c^t}\right)^{\frac{1}{\rho_c^t}} \qquad c \in (CE \cap CD) \text{ ----------(4.5)}$$

(Source: Lofgren et al, 2002)

Where,

a^t_c = a CET function shift parameter,

δ^t_c = a CET function share parameter, and

ρ^t_c = a CET function exponent.

Profit maximization drives producers to sell in those markets where they can achieve the highest returns. These returns are based on domestic and export prices (where the latter is determined by the world price times the exchange rate adjusted for any taxes or subsidies). Under the small-country assumption, Ethiopia is assumed to face a perfectly elastic world demand at a fixed world price. The final ratio of exports to domestic goods is determined by the endogenous interaction of relative prices for these two commodity types.

4.3.2.12 Export – Domestic supply ratio

$$\frac{QE_c}{QD_c} = \left(\frac{PE_c}{PDS_c} \cdot \frac{1-\delta_c^t}{\delta_c^t} \right)^{\frac{1}{\rho_c^t - 1}} \qquad c \in (CE \cap CD) \text{ ----------(4.6)}$$

(Source: Lofgren et al, 2002)

Commodities that are exported are further disaggregated according to their region of destination under a CES specification. Allowing substitution between regions is preferable to the use of fixed shares, since changes in relative prices across regions should lead to a shift in the geographic composition of exports.

Domestically produced commodities that are not exported are supplied to the domestic market. Substitution possibilities exist between imported and domestic goods under a CES Armington specification. Such substitution can take place both in final and intermediates usage. The Armington elasticities vary across sectors, with lower elasticities reflecting greater differences between domestic and imported goods.

4.3.2.15 Import- domestic demand ratio

$$\frac{QM_c}{QD_c} = \left(\frac{PDD_c}{PM_c} \cdot \frac{\delta_c^q}{1-\delta_c^q} \right)^{\frac{1}{1+\rho_c^q}} \qquad c \in (CM \cap CD) \text{ ----------(4.7)}$$

(Source: Lofgren et al, 2002)

Where,

$a^q{}_c$ = an Armington function shift parameter,

$\delta^q{}_c$ = an Armington function share parameter, and

$\rho^q{}_c$ = an Armington function exponent

Under the small country assumption, Ethiopia is assumed to face infinitely elastic world supply at fixed world prices. The final ratio of imports to domestic goods is determined by the cost

minimizing decision-making of domestic demanders based on the relative prices of imports and domestic goods (both of which include relevant taxes). Imports are further disaggregated according to their region of origin using a CES function. This specification allows for regionally specific tariffs, and for substitution between regions following changes in relative import prices.

4.3.3 Institutional Block

The model has households and the government as domestic institutions. The households are divided in to rural and urban as well as poor and rich. The main sources of income for households are factor returns generated through production. Capital and skilled labor are assumed to be activity specific and fully employed. This implies that these factors are immobile and will earn sector specific returns. Semiskilled labor and land are fully employed but mobile across sectors. This implies their returns are not sector specific. Full employment assumption leaves the amount of the factors to be fixed. Unskilled labor, on the other hand, is mobile but unemployed. Its amount will not be fixed.

4.3.4 System Constraint Block

System constraint deals with the mechanisms where equilibrium is attained both in goods market and factor market. Equilibrium in the goods market is achieved by the equality of demand for goods and supply of goods. Demand is the sum of private consumption, investment spending, government consumption, exports as well as transaction demand. Supply, on the other hand, is the sum of domestic production and imported commodities. Equilibrium is attained through the endogenous interaction of domestic and foreign prices, and the effect that shifts in relative prices have on sectoral production and employment, and hence institutional incomes and demand.

Factor market equilibrium is brought by the equality of factor demand and factor supply. The equilibrium is highly dependent on how the relationship between factor supply and wages is

defined. We assumed capital and skilled labor to be fully employed and sector-specific, implying that sector-specific wages adjust to ensure that demand for capital and skilled labor equals total supply. Unemployment amongst unskilled labour is assumed to be sufficiently large such that wages are fixed in real terms and supply passively adjusts to match demand.

4.3.4.1 Factor markets

$$\sum_{a \in A} QF_{fa} = \overline{QFS}_f \qquad f \in F \text{ ----------(4.8)}$$

(Source: Lofgren et al, 2002)

Where,

$\overline{QFSf}$ = quantity supplied of factor (exogenous variable).

Equation imposes equality between the total quantity demanded and the total quantity supplied for each factor. The factor wage WF_f is the equilibrating variable that assures that this equation is satisfied.

4.3.4.4 Government balance

$$YG = EG + GSAV \text{ ----------(4.9)}$$

(Source: Lofgren et al, 2002)

Where,

YG = total government income

EG = total government expenditure

$GSAV$ = government savings.

Government balance imposes equality between current government revenue and the sum of current government expenditures (not including government investment) and savings.

4.3.4 Macro closure

The model includes has three macroeconomic accounts: the current account, the government balance, and the savings and investment account. The following assumptions, commonly called macroclosure rules in CGE, are necessary to bring equilibrium in different macro accounts.

For the current account, flexible exchange rate adjusts in order to maintain a fixed level of foreign borrowing. This is found to be appropriate as Ethiopia follows a flexible exchange rate system.

In the government account the level of direct and indirect tax rates, as well as real government consumption, are held constant. As such the balance on the government budget is assumed to adjust to ensure that public expenditures equal receipts. This closure is chosen since it is assumed that changes in direct and indirect tax rates are politically motivated and thus are adopted in isolation of changes in other policies or the economic environment.

For the savings-investment account, closure rule used by Dorosh and Thurlow (2009) is used. This means, real investment adjusts to changes in savings. Thus, we have saving driven investment, where saving is assumed to be fixed.

Finally, the consumer price index is chosen as the numeraire such that all prices in the model are relative to the weighted unit price of households‘ initial consumption bundle.

4.3.2 Between-period Specification

The between period specification represents the dynamics of the model. Some variables are adjusted endogenously while others exogenously. The process of capital accumulation is modeled endogenously, with the previous-period investment generating new capital stock for the subsequent period. The model also takes exogenous population growth in to account. Equations of the between-period specification are given in Table A3 in the appendix.

4.3.3 Limitations of the Model

Thurlow (2002) identifies the following as the major limitations of the CGE model. First, CGE models depend on Walrasian equilibrium which assumes market clearance. However, certain institutional and structural factors might bring rigidities resulting imbalance between supply and demand. Of course, in this paper we tried to incorporate rigidities in the model. Capital and skilled labor are assumed to be activity specific, which implies they are immobile. We also assume unskilled labor to be unemployed.

Second, the use of recursive dynamic CGE model is also a deviation from the truly dynamic CGE model which assumes perfect foresight rather than adaptive expectations assumption. Despite its deviation, the model however applies for countries like Ethiopia where economic agents lack perfect foresight.

Third, the model assumes that there is no interaction between monetary and real sectors. The use of a numeraire and the lack of an explicitly modeled monetary sector imply that the model is essentially one of a barter economy in which money is neutral.

4.5 Data sources for the model

The main dataset used is the 2005/06 social accounting matrix (SAM) developed by the Economic Development Research Institute (EDRI). This SAM includes four agro-ecological zones and a detailed regional disaggregation of household groups.

4.6 Definition of Scenarios

The EU-ACP EPA is a negotiation to liberalize the whole economy in EU-ACP countries. To examine the impact of EU-ACP EPA on the Ethiopian economy, and thus achieve the objectives, four different but related simulations are considered.

Simulation 1: One time complete abolishment of tariff in the year 2011 for all products except textile, cloth, and leather which are considered by the government as strategic sectors.
Simulation 2: Gradual removal of tariff for all products except textile, leather, and cloth. Since the simulation runs for 5 years between 2011 and 2015, a yearly 20% tariff removal on all products is considered.
Simulation 3: One time complete abolishment of tariff in the year 2011 for all products.
Simulation 4: Gradual removal of tariff for all products, from 2011 to 2015.

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Chapter Five

Results and Discussion

5.1 Simulations

Considering only tariff barriers, five simulations are considered.

Simulation 0: This assumes that the status quo continues. That is, no FTA for any product at all. In CGE terminology, this is known as the baseline simulation.

Simulation 1: One time complete abolishment of tariff in the year 2011 for all products except textile, cloth, and leather which are considered by the government as strategic sectors. This type of simulation considers the case where the country decides to join the EPA at one time but discriminating products. Countries usually have sectors which they believe are pillars of the economy. That is, they plan to give emphasis for some sectors. The form of the emphasis given might vary but usually it involves protecting those industries from external competition. To make these sectors competitive, import tariff will be levied on same commodities which these sectors could produce but are imported from outside. In the Ethiopian case, it is clearly explained in the Growth and Transformation Plan (GTP) that some sectors will receive special support (GTP, pp.27). Textile and apparel products, and leather and leather products are included in the list. So, we avoided these sectors from the simulation.

Simulation 2: Gradual removal of tariff for all products except textile, leather, and cloth. Since the simulation runs for 5 years between 2011 and 2015, a yearly 20% tariff removal on all products is considered. That is 20% in 2011, 40% in 2012, 60% in 2013, 80% in 2014 and 100% in 2015. This simulation is considered because it might be difficult to eliminate all tariffs at one time. The government might be afraid of the revenue loss and other impacts which the tariff removal will bring. Under this circumstance, it might resort to gradual removal of tariff.

Simulation 3: One time complete abolishment of tariff in the year 2011 for all products. Even if this seems unlikely in the real world, it will help for comparison to other simulations. Particularly, it will help us see the impact that protecting the above sectors will have on the economy.

Simulation 4: Gradual removal of tariff for all products. This is also important for comparison.

All the simulations are done using the EDRI 2005/2006 Ethiopian SAM data.

5.2 The Big Picture: Macro Results

Table 1 summarizes the results of our simulation for some macro variables. GDP is one of the important macro variables. We have two variables for GDP: GDP at factor cost (GDPFC2) and GDP at market prices (GDPM2). PRVCON is private consumption, ABSORP is absorption, FIXINV is fixed investment, and GOVCON is government consumption.

Table 5.1 Impact on Selected Macro Variables (% change of real values)

Macro variables	INITIAL	Sim 0	Sim 1	Sim 2	Sim 3	Sim 4
ABSORP	162288.7	19.1888	19.2245	19.2249	19.2275	19.2277
PRVCON	110480.5	21.3488	21.3966	21.397	21.4016	21.4019
FIXINV	31858.93	16.1402	16.1241	16.124	16.117	16.1169
GOVCON	15910.68	5.7	5.7	5.7	5.7	5.7
EXPORTS	16557.78	32.6741	32.7987	32.7971	32.8259	32.8234
IMPORTS	-46735.6	21.6269	21.7236	21.7223	21.7447	21.7427
GDPMP2	132110.9	20.9849	21.0233	21.0237	21.0265	21.0267
GDPFC2	122359.6	21.8696	21.919	21.9191	21.927	21.9269

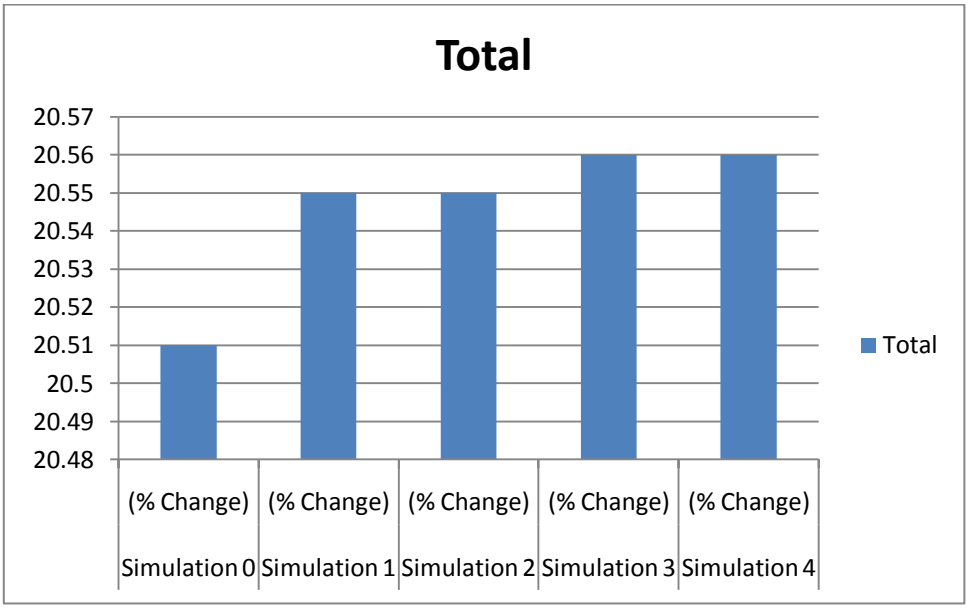
(Source: Simulation result)

The growth rates of both GDPFC2[15] and GDPMP2 have increased in all the simulations. The highest growth rates for both are registered, however, under simulation four. That is, the growth rate is the highest when Ethiopia removes the tariff rate for all products gradually. The growth in

[15] GDPFC, which is GDP at factor cost is also known as total value added. It represents the earnings received by factors of production, such as employee compensation and gross operating services.

GDP might be explained by the increase in Disaggregated Activity Production Levels (QATABPY). We can compare table 1 with figure 1 below. The trend in total disaggregated activity production level is similar with the trend in GDP. The growth rates of both GDP and Disaggregated activity production levels increase in all simulations. Both also have highest percentage increases in simulation four and the lowest in simulation 1.

Fig 5.1. Disaggregated Activity Production Levels (QATABPY)



(Source: Simulation result)

The increase in GDP might also be because of the increase in private consumption. Private consumption is the largest component of aggregate demand. According to Keynesian analysis, where demand derives supply, increase in expenditure will lead to an increase in GDP. The increase in GD could not be because of the increase in investment because our results show that investment itself decreases.

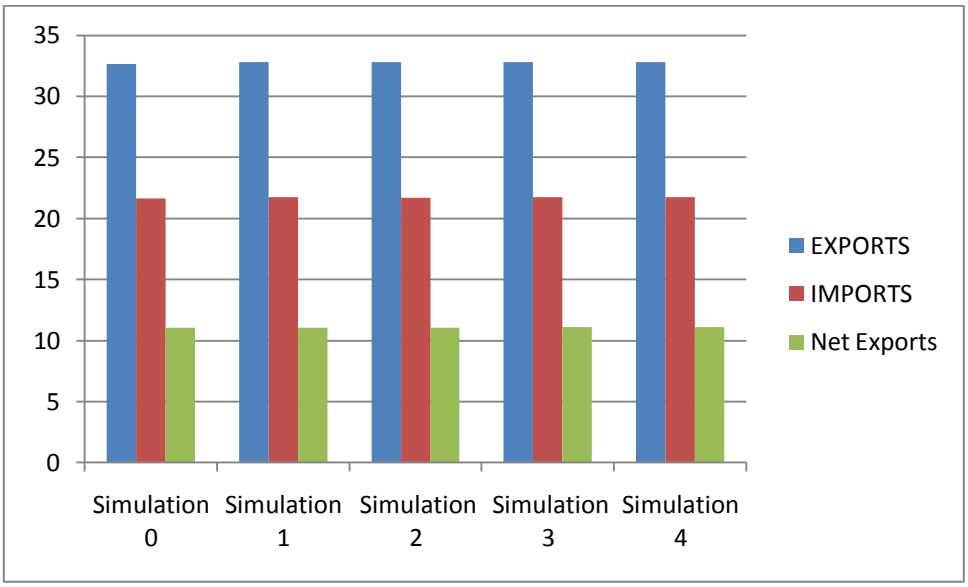
5.3 Direction of Trade

Aggregate effects on import and export volumes point to a favorable movement towards trade surplus, as exports grow at a faster rate than imports. The intuition is as follows: tariff removal

reduces the price of imports, and as a result, there will be a higher demand for imports. The increase in exports might be because of the increase in GDP. Besides, increase in imports might contribute to an increase in exports as most of our imports are machineries and equipment which will be used as an input in the production of goods and services. This will increase the production capacity of the country, leading to an increase in exports.

The increase in exports, however, is greater than the increase in imports. This will lead to an improvement in trade balance. See figure 5.2 below.

Figure 5.2 Direction of trade



(Source: Simulation result)

In all the four simulations, the increase in exports is greater than the increase in imports. As can be seen from table 1, the highest increase in both is registered in simulation three.

The impact of FTA across commodities depends on whether the commodity is traded or not. Particularly, the FTA decreases the prices of commodities imported while the price of commodities that are not imported will increase. The main exports and imports of the country as of 2005/2006 are given in the SAM, and they are attached in the appendix 1. As can be seen

from the appendix, the main imports of Ethiopia are machinery, transport and other equipment (26.8%), where transport services share is (17.1%), petroleum (12.1%), Chemicals, Rubber & Plastic Products (9.5%), metal and metal products (8.5%). The main exports of Ethiopia, on the other hand, are primary agricultural products (41%), transport services (27.5%), processed food products (3.3%). Our major imports are very essential products for production.

Table 5.2 Price of Imports

Price of Imports				
Sim 0		Agriculture	Industry	Service
		-6.86126	-6.88918	-6.6421
Sim 1	Row	-6.84236	-6.87011	-6.6246
	Rowcom	-6.83632	-6.86073	-6.6246
	Roweu	-7.02956	-7.4813	-6.6246
Sim 2	Row	-6.84093	-6.86861	-6.6235
	Rowcom	-6.8349	-6.85924	-6.6235
	Roweu	-7.02815	-7.47979	-6.6235
Sim 3	Row	-6.83533	-6.86299	-6.6181
	Rowcom	-6.82929	-6.85363	-6.6181
	Roweu	-7.02255	-7.85062	-6.6181
Sim 4	Row	-6.83344	-6.86108	-6.6165
	Rowcom	-6.82742	-6.85174	-6.6165
	Roweu	-7.02068	-7.8487	-6.6165

(Source: Simulation result)

As can be seen from the table 5.2, the EPA decreases the price of imports from EU while it increases the price of imports from COMESA and rest of the world. This will make imports from EU cheaper than imports from COMESA and rest of the world. This will result trade diversion from COMESA and rest of the world to EU. Quantity of imports coming from EU will increase while imports from COMESA and rest of the world will decrease. See the following table. As can be clearly observed, quantity of imports from COMSA and EU decreased in all simulations. For example, in simulation 1, imports of agriculture from rest of the world decreased from 32.2 percent to 31.97125 percent, imports from COMESA decreased from 33.92077 percent to

33.69846. Imports from EU, on the other hand, increased from 33.92077 to 34.25154. The impact of EPA on quantity of imports is also different among sectors. The price reduction effect on EU imports is significant in the industrial sector. Besides the reduction in the price of industrial products from EU is higher in simulations 3 and 4, where there is no protection for strategic sectors. Compare -7.4813 and -7.47979 with -7.8487 and -7.85062. See the following table below. The significance of the impact on industrial sector is because of the tradable nature of the commodities. Most of Ethiopia‘s imports are industrial products.

Table 5.3 Quantity of imports

Quantity of imports		Agriculture	Industry	Service
Sim 0	row	32.2	24.37063	19.94333
	rowcom	33.92077	25.09857	19.94333
	roweu	33.92077	25.09857	19.94333
Sim 1	row	31.97125	24.07625	19.985
	rowcom	33.69846	24.76214	19.985
	roweu	34.25154	27.02	19.985
Sim 2	row	31.985	24.0725	19.98667
	rowcom	33.70462	24.75714	19.98667
	roweu	34.25769	27.01429	19.98667
Sim 3	row	31.95125	23.84313	19.98833
	rowcom	33.67308	24.495	19.98833
	roweu	34.22538	28.92643	19.98833
Sim 4	row	31.96375	23.83875	19.98833
	rowcom	33.67692	24.49	19.98833
	roweu	34.23	28.92	19.98833

(Source: Simulation result)

The price of ctext, ccloth, and cleat depends on our simulation: whether we included them in the FTA. If they are included in the FTA, their price will decrease. See the table on price of imports (PMXPY) in the appendix for simulations 3 and 4. But if they are excluded from the FTA, their price will not decrease. See the table on price of imports (PMXPY) for simulations 1 and 2. This implies that the government could protect its strategic sectors by imposing tariff on imports of the same commodity.

5.4 Government Revenue

Tax is an important part of government revenue. Tariff revenue is an element of tax. Since FTA involves removal of tariff, it leads to the decrease in government revenue. Our simulation results also show this. In the table and figure below, we compare simulations 1 to 4 to the baseline simulation (Simulation 0). Up to 2011, government revenue is the same for all as the simulation are not imposed. In 2011, the value of government revenue is different for all the simulation.

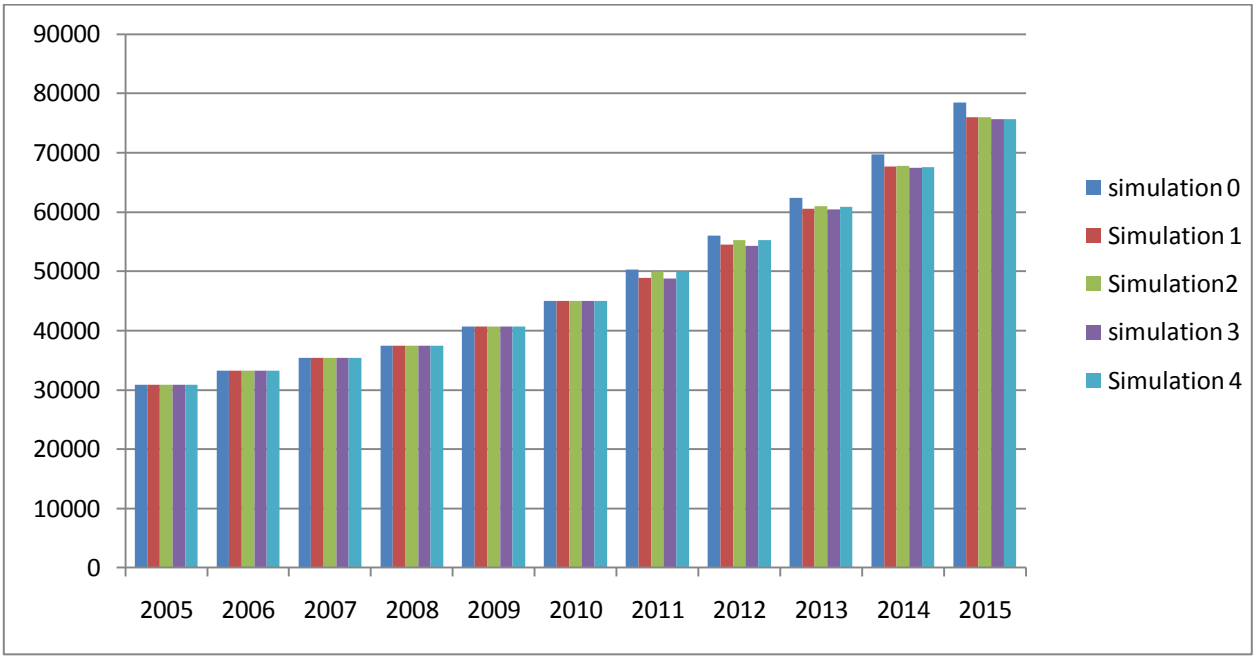
Government revenue is the highest in the baseline simulation. This simply implies the different simulation which involve tariff removal have led to decrease in government revenue. We can use both the table and the figure to see which of the simulations have led to the highest decrease in government revenue. Accordingly, up to 2011, simulation 2 has led to the lowest decrease in government revenue even if this is overtaken by simulation 1 in 2015. The highest decrease in government revenue is brought by simulation 3 which is one time complete abolishment of tariff in the year 2011 for all products. That means for the coming five years, including 2011, there will be no tariff revenue. This is not the case for the other simulations. Simulation 1 leaves textile, cloth, and leather out of FTA. This means the government can still collect tariff from this sectors. Simulation 2 not only leaves these same sectors out of FTA but also permits the government to collect a portion of the previous tariff on other commodities too as the tariff removal is in phases. Simulation 4, on the other hand, does not leave textile, leather, and cloth out of FTA but still it permits the government to collect a portion of previous tariff.

Table 5.3 Government Revenue

Simulations	2005	2011	2012	2013	2014	2015
Sim 0	30861	50245	56037	62434	69776	78429
Sim 1	30861	48906	54466	60605	67666	76020
Sim 2	30861	50022	55312	61030	67767	76016
Sim 3	30861	48805	54330	60418	67413	75686
Sim 4	30861	50011	55265	60903	67531	75682

(Source: Simulation result)

Figure 5.3: Government Revenue

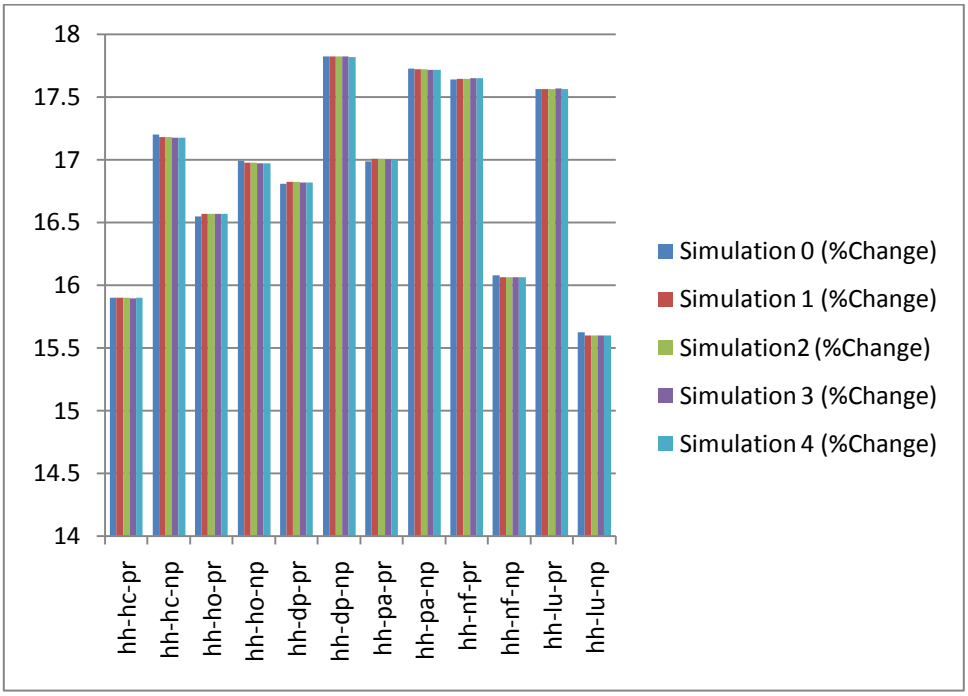


(Source: Simulation result)

5.5 Impact on Households

In the dynamic CGE model, we can also analyze the impact of FTA on households using values such as household consumption expenditure, household consumption and average price of output. As can be seen from figure 5.5, household consumption expenditure, EHXPY, either decreases or remains the same for the non poor (abbreviated as np), and increases (or remains the same) for the poor (abbreviated as pr).

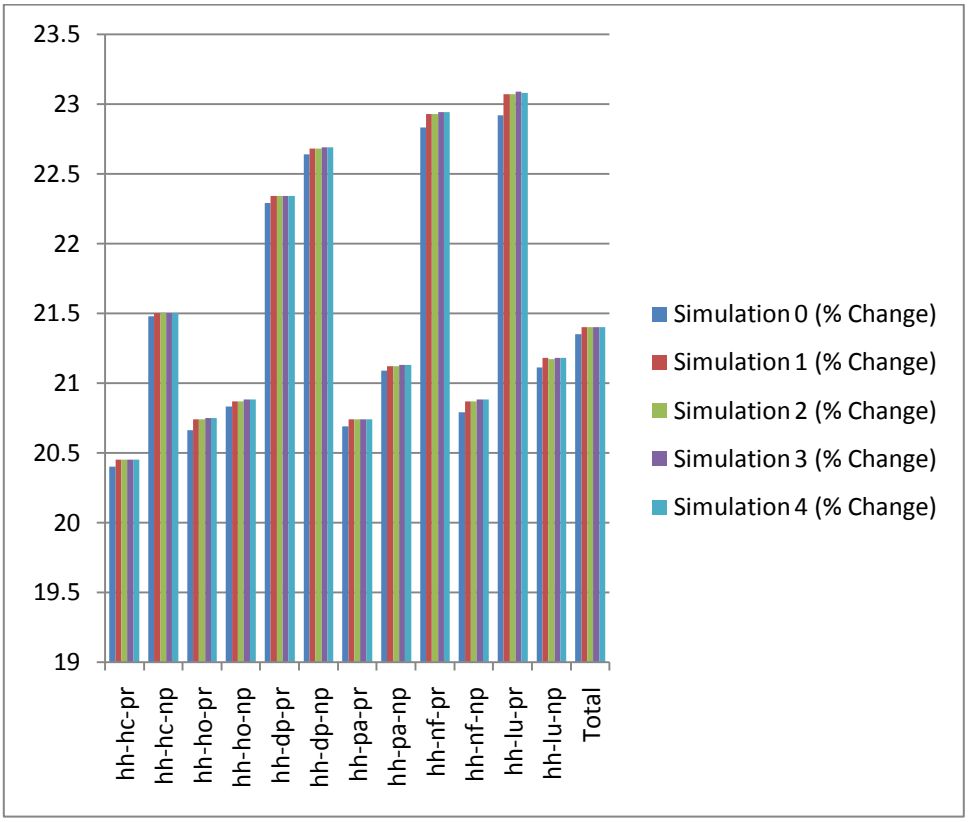
Figure 5.4: Household Consumption Expenditure



(Source: Simulation result)

Household consumption expenditure is the product of household consumption and average output price. Household consumption has increased for both the poor and the non poor even if the increase for the poor is greater than the increase for the non-poor (see figure below). Thus, a decrease in household consumption expenditure for the non poor implies that the price goods they consumed have decreased by larger amount than the price the poor consumed. We have found that the EPA decreases the price of industrial products more than it decreases the price of agricultural commodities and services. Thus, the decrease in household expenditure for the non poor might be because of their higher consumption of industrial products compared to the poor.

Figure 5.5 Disaggregated Real Household Consumption



(Source: Simulation result)

Chapter Six

Conclusions and Policy Implication

6.1 Conclusions

In this paper, we tried to see the impact of joining EU-ACP EPA on the Ethiopian economy. The main aim of EU-ACP EPA is to create a free trade area (FTA) in the trade relations between European Union countries and African, Caribbean and Pacific countries. To achieve this, the 2005/2006 Ethiopian SAM is used as a data source. Since joining EPA like EU-ACP affects the overall economy, we used a method which is suitable for this, namely Computable General Equilibrium (CGE) method. Specifically, a recursive dynamic CGE model is used for analysis.

In deciding to become members in EPAs, there are a lot of options for policy makers. In this paper we tried to investigate four possible options which could be pursued in EU-ACP EPA for Ethiopia. These four scenarios involve whether to remove tariff step by step or at one time, and whether to apply the FTA for all commodities or to exclude some.

The paper paid attention for the impact of EU-ACP EPA on GDP, Exports, Imports, Government Revenue, Household consumption, and Household consumption income. Mixed results are found, i.e. some are affected positively and others negatively.

Due to the EPA, GDP showed an increase in all the four scenarios. Both GDP at market price and GDP at factor cost increased. The highest increase in GDP was registered when the tariff rate is removed for all products gradually.

The other positive impact of the EPA is increase in Disaggregated Activity Production Levels. Even if the change in disaggregated activity production levels is not uniform, as it increases for some commodities and decreases for other, overall it showed an increase.

The EU-ACP EPA increased both imports and exports. The increase in imports is straight forward because of the decrease in import price when tariff is removed. The increase in exports, on the other hand, might be due to different reasons. First, an increase in GDP will help increase the potential for our export quantity. Second, when imports are cheap, we have seen an increase in imports of machineries which could be used in the production process.

Not all the effects are, however, positive. Government revenue has decreased due to the elimination of tariff. This is because, as shown in table 4.1 in chapter 4, tariff revenue is a very important source of government revenue. Its removal implies there is no more government income from tariff. The highest decrease in government revenue is brought by the complete abolishment of tariff in 2011 for all products. This is logical since, it leaves no possibility for the government to collect tariff. Other scenarios, on the other hand, give the government the chance to collect tariff revenue partially.

The other impact of EU-ACP EPA is on households. It is found that disaggregated household consumption increased for both the poor and the non-poor even if the increase for the poor is greater than the increase for the poor. The household consumption expenditure decreases for the non poor and increases for the poor. Our results also show that price of industrial products decrease by a higher percentage than price of agricultural products and services. Thus, decrease in household consumption expenditure for the non-poor while their quantity of consumption is increasing might be because of their higher consumption of industrial products as compared to the poor.

The other finding is the impact on strategic sectors: cloth, textile, and leather. Excluding them from the EPA will make these industries competitive as their price will not decrease. This can be simply observed by comparing simulations 1 and 2 with simulations 3 and 4. But the impact on

GDP and trade balance is not observable. This is because exports increase by a higher amount in simulation 3 and 4 where there is no discrimination for the strategic sectors. GDP also increases by a higher amount in simulations 3 and 4. Thus, our findings do not support the so called protection of infant industries.

6.2 Policy Implications

Depending on the above findings, the following implication could be taken:

- The importance of protecting strategic sectors should be investigated before excluding them from the EPA. Sometimes, this action could only benefit those sectors while the overall economy is affected negatively. Our findings show that GDP increases by a higher percentage when these sectors are not protected.
- One of the negative impacts of EPA is loss of government revenue. In countries like Ethiopia, where tariff revenue is the significant contributor to government income (in 2005/2006 it was 30%), policy should be put in place to compensate this loss in government revenue. The policy option could include broadening the domestic tax base, increasing the collection rate etc.
- The main purpose of EPA is benefiting consumers. Consumers will be beneficial at the cost of producers. Our results show an increase in private consumption while investment decreases. The decrease in investment might be because of fear for the competition with foreign producers. So, policy makers have to compensate producers by making the investment environment attractive, such as avoiding bureaucracy.

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Appendices

Appendix1. Factor Cost in Billion birr

Sectors	Total Labor	Agriculture labor	Non-agriculture Labor	Total capital land	Agriculture Capital Land	Livestock capital	Non-agriculture Capital-land	Sectoral value-added at factor cost
Agriculture and related activities	44.29	44.21	0.08	14.46	8.46	5.47	0.52	58.74
Cereals	13.91	13.88	0.02	2.98	2.98			16.88
Cash crops	4.34	4.34	0.01	3.22	3.22			7.57
Livestock	12.13	12.11	0.02	5.47		5.47		17.60
Other agricultural activities	13.90	13.88	0.02	2.78	2.26		0.52	16.69
Manufacturing	2.38	0.00	2.38	3.37	0.00	0.00	3.37	5.75
Milling Services (small scale)	0.12		0.12	0.39			0.39	0.51
Food processing	0.88		0.88	1.39			1.39	2.27
Other manufacturing activities	1.38		1.38	1.59			1.59	2.97
Other industries	2.21		2.21	6.08	0.00	0.00	6.08	8.29
Utility	0.66		0.66	1.63			1.63	2.29
Mining and quarrying	0.19		0.19	0.48			0.48	0.67
Construction	1.36		1.36	3.97			3.97	5.33
Services	11.38	0.00	11.38	38.06	0.00	0.00	38.06	14.44
Wholesale and retail trade	2.83		2.85	11.00			11.00	13.85
Transport and communication	0.61		0.61	5.75			5.75	6.36
Hotels and restaurants	1.28		1.28	1.26			1.26	2.54
Financial services	0.34		0.34	1.94			1.94	2.29
Real state	0.05		0.05	9.61			9.61	9.66
Public administration	1.85		1.85	4.10			4.10	5.95
Education	1.99		1.99	2.30			2.30	4.29
Health	0.55		0.55	0.52			0.52	1.06
Other service activities	1.86		1.86	1.57			1.57	3.43
Total value added at factor cost	60.26	44.21	16.05	61.96	8.46	5.47	48.03	122.22

(Source: EDRI, 2009)

Appendix 2 Exports and imports of Ethiopia in 2005/2006

Exports		Imports	
Export items	Value (in million birr)	Import items	Value (in million birr)
Cbarl	0	Cwhea	1,527
Cwhea	0	Cmaiz	2
Cmaiz	2	Cpuls	280
Csorg	3	Cvege	2
Cpuls	219	Cfrui	10
Coils	1,458	Ccott	3
Cvege	59	Cteal	1
Cfrui	45	Ctoba	32
Cchat	814	Ccoff	2
Ccoff	3,207	Cflow	38
Cflow	193	Cocrp	188
Cocrp	370	Ccatt	3
Ccatt	508	Cmilk	1
Cmilk	26	Cpoul	5
Cpoul	27	Caprd	3
Caprd	198	Cfish	2
Cfish	52	Cfore	2
Cfore	0	Ccoal	9
Comin	1	Cngas	20
Cdair	26	Comin	36
Cvprd	116	Cdair	66
Cgmll	256	Cvprd	684
Cpsgr	193	Cgmll	92
Cptea	32	Cpsgr	303
Cfood	61	Cptea	1
Cbeve	132	Cfood	345
Cptob	26	Cbeve	156
Ctext	145	Cptob	46
Cclth	15	Ctext	1,269
Cleat	539	Cclth	785
Cwood	1	Cleat	93
Cpapr	78	Cwood	334
Cchem	322	Cpapr	637
Cnmet	5	Cptrl	5,847
Cmetl	552	Cfert	1,276
Cmach	17	Cchem	4,340
Cvehe	160	Cnmet	287
Ceequ	206	Cmetl	4,190

Coman	4	Cmach	5,015
Cwatr	52	Cvehe	4,022
Ctrad	336	Ceequ	3,957
Chotl	404	Coman	381
Ctran	4,600	Cwatr	1
Ccomm	512	Ctrad	84
Cfsrv	238	Chotl	494
Cbsrv	380	Ctran	7,459
Creal	102	Ccomm	303
Cosrv	76	Cfsrv	564
Cpadm		Cbsrv	1,694
Ceduc	1	Creal	32
Cheal	51	Cosrv	3
Fcap	70	Ceduc	73
Gov	18,073	Cheal	3
s-i	13,406	Gov	1,367
Total	48,370	Total	48,370

Appendix 3 Quantity of Imports

QMXPY: Quantity of Imports for Simulation 1									
	Row	row	row	Rowcom	rowcom	rowcom	roweu	roweu	roweu
	INITIAL	BASE(**% Change**)	FTA(**% Change**)	INITIAL	BASE(**% Change**)	FTA(**% Change**)	INITIAL	BASE(**% Change**)	FTA(**% Change**)
Cwhea	35.41	35.35	35.29	0.08	35.35	35.29	42.85	35.35	35.29
Cpuls	3.47	27.54	27.49	0.01	27.54	27.49	4.21	27.54	27.49
Cteal	0.03	40.29	39.43						
Ctoba	0.31	25.32	25.29	0.15	25.32	25.29	0.04	25.32	25.29
Cocrp	3.24	33.42	33.37	2.78	33.42	33.37	3.24	33.42	33.37
Cpoul	2.02	30.94	30.93	1.01	30.94	30.93	2.02	30.94	30.93
Cfish	2.3	28.49	28.46	0.46	28.49	28.46	1.84	28.49	28.46
Ccoal	11.03	9.97	10.09						
Cngas	24.24	23.97	23.94						
Comin	9.09	58.81	58.33	18.18	58.81	58.33	9.09	58.81	58.33
Cdair	23.17	61.46	61.39	19.86	61.46	61.39	23.17	61.46	61.39
Cvprd	199.02	23.58	23.57	170.59	23.58	23.57	199.02	23.58	23.57
Cgmll	42.31	23.87	23.88	9.4	23.87	23.88	42.31	23.87	23.88
Cpsgr	223.07	27.94	28.01	15.93	27.94	28.01	79.67	27.94	28.01
Cptea	1.23	34.55	34.02	0.15	34.55	34.02	0.15	34.55	34.02
Cfood	157.46	29.7	28.05	13.76	29.7	28.05	288.37	29.7	35.24
Cbeve	41.83	25.2	24.9	1.15	25.2	24.9	140.97	25.2	26.11
Cptob	47.92	25.52	25.49	14.18	25.52	25.49	4.05	25.52	25.49
Ctext	1594.52	27.29	27.26	6.74	27.29	27.26	39.74	27.29	27.26

Cclth	1091.75	24.71	24.69	5.71	24.71	24.69	15.55	24.71	24.69
Cleat	46.38	41.01	40.94	46.38	41.01	40.94	39.75	41.01	40.94
cwood	251.84	22.29	21.97	71.95	22.29	21.97	35.98	22.29	24.68
Cpapr	582.29	21.11	20.69	45.34	21.11	20.69	98.65	21.11	24.31
Cptrl	8361.06	17.61	17.61						
Cfert	1761.09	20.94	20.94						
Cchem	3935.36	21.22	20.64	211.15	21.22	20.64	857.75	21.22	24.58
cnmet	124.83	42.01	40.22	107	42.01	40.22	124.83	42.01	45.65
Cmetl	4034.15	18.33	18.08	95.68	18.33	18.08	599.42	18.33	19.5
Cmach	3494.41	15.33	15.25	35.73	15.33	15.25	1696.73	15.33	15.46
Cvehe	3931.49	16.33	16.31	4.52	16.33	16.31	585.27	16.33	16.55
Ceequ	3929.92	20.31	20.32	89.51	20.31	20.32	524.19	20.31	20.94
coman	421.88	30.72	29.91	3.81	30.72	29.91	63.98	30.72	42.12
Ctrad	29.55	17.88	17.95	25.33	17.88	17.95	29.55	17.88	17.95
Chotl	222.77	21.84	21.91	49.51	21.84	21.91	222.77	21.84	21.91
Ctran	3358.43	19.79	19.83	746.32	19.79	19.83	3358.43	19.79	19.83
ccomm	253.93	22.65	22.69	0.61	22.65	22.69	48.84	22.65	22.69
Cfsrv	282.41	19.71	19.71	28.24	19.71	19.71	254.17	19.71	19.71
Cbsrv	847.12	17.79	17.82	84.71	17.79	17.82	762.41	17.79	17.82

QMXPY: Quantity of Imports (% Change) for Simulation 2

	Row	row	row	Rowcom	rowcom	rowcom	roweu	roweu	roweu
	INITIAL	BASE(**% Change**)	FTA(**% Change**)	INITIAL	BASE(**% Change**)	FTA(**% Change**)	INITIAL	BASE(**% Change**)	FTA(**% Change**)
Cwhea	35.41	35.35	35.29	0.08	35.35	35.29	42.85	35.35	35.29
Cpuls	3.47	27.54	27.49	0.01	27.54	27.49	4.21	27.54	27.49
Cteal	0.03	40.29	39.58						
Ctoba	0.31	25.32	25.3	0.15	25.32	25.3	0.04	25.32	25.3
Cocrp	3.24	33.42	33.37	2.78	33.42	33.37	3.24	33.42	33.37
Cpoul	2.02	30.94	30.92	1.01	30.94	30.92	2.02	30.94	30.92
Cfish	2.3	28.49	28.46	0.46	28.49	28.46	1.84	28.49	28.46
Ccoal	11.03	9.97	10.08						
Cngas	24.24	23.97	23.94						
Comin	9.09	58.81	58.33	18.18	58.81	58.33	9.09	58.81	58.33
Cdair	23.17	61.46	61.39	19.86	61.46	61.39	23.17	61.46	61.39
Cvprd	199.02	23.58	23.57	170.59	23.58	23.57	199.02	23.58	23.57
Cgmll	42.31	23.87	23.88	9.4	23.87	23.88	42.31	23.87	23.88
Cpsgr	223.07	27.94	28.01	15.93	27.94	28.01	79.67	27.94	28.01
Cptea	1.23	34.55	34.11	0.15	34.55	34.11	0.15	34.55	34.11
Cfood	157.46	29.7	28.04	13.76	29.7	28.04	288.37	29.7	35.23
Cbeve	41.83	25.2	24.87	1.15	25.2	24.87	140.97	25.2	26.08
Cptob	47.92	25.52	25.49	14.18	25.52	25.49	4.05	25.52	25.49

Ctext	1594.52	27.29	27.26	6.74	27.29	27.26	39.74	27.29	27.26
Cclth	1091.75	24.71	24.69	5.71	24.71	24.69	15.55	24.71	24.69
Cleat	46.38	41.01	40.94	46.38	41.01	40.94	39.75	41.01	40.94
cwood	251.84	22.29	21.97	71.95	22.29	21.97	35.98	22.29	24.68
Cpapr	582.29	21.11	20.69	45.34	21.11	20.69	98.65	21.11	24.31
Cptrl	8361.06	17.61	17.61						
Cfert	1761.09	20.94	20.95						
Cchem	3935.36	21.22	20.64	211.15	21.22	20.64	857.75	21.22	24.58
cnmet	124.83	42.01	40.22	107	42.01	40.22	124.83	42.01	45.65
Cmetl	4034.15	18.33	18.09	95.68	18.33	18.09	599.42	18.33	19.5
Cmach	3494.41	15.33	15.25	35.73	15.33	15.25	1696.73	15.33	15.46
Cvehe	3931.49	16.33	16.31	4.52	16.33	16.31	585.27	16.33	16.55
Ceequ	3929.92	20.31	20.32	89.51	20.31	20.32	524.19	20.31	20.93
Coman	421.88	30.72	29.86	3.81	30.72	29.86	63.98	30.72	42.08
Ctrad	29.55	17.88	17.96	25.33	17.88	17.96	29.55	17.88	17.96
Chotl	222.77	21.84	21.91	49.51	21.84	21.91	222.77	21.84	21.91
Ctran	3358.43	19.79	19.83	746.32	19.79	19.83	3358.43	19.79	19.83
Ccomm	253.93	22.65	22.69	0.61	22.65	22.69	48.84	22.65	22.69
Cfsrv	282.41	19.71	19.71	28.24	19.71	19.71	254.17	19.71	19.71
Cbsrv	847.12	17.79	17.82	84.71	17.79	17.82	762.41	17.79	17.82
QMXPY		c							
QMXPY : Quantity of Imports (% change) for Simulation 3									
	Row	row	row	Rowcom	rowcom	rowcom	roweu	roweu	roweu
	INITIAL	BASE(**% Change)**	FTA(**% Change)**	INITIAL	BASE(**% Change)**	FTA(**% Change)**	INITIAL	BASE(**% Change)**	FTA(**% Change)**
Cwhea	35.41	35.35	35.27	0.08	35.35	35.27	42.85	35.35	35.27
Cpuls	3.47	27.54	27.47	0.01	27.54	27.47	4.21	27.54	27.47
Cteal	0.03	40.29	39.42						
Ctoba	0.31	25.32	25.28	0.15	25.32	25.28	0.04	25.32	25.28
Cocrp	3.24	33.42	33.35	2.78	33.42	33.35	3.24	33.42	33.35
Cpoul	2.02	30.94	30.9	1.01	30.94	30.9	2.02	30.94	30.9
Cfish	2.3	28.49	28.45	0.46	28.49	28.45	1.84	28.49	28.45
Ccoal	11.03	9.97	10.12						
Cngas	24.24	23.97	23.93						
Comin	9.09	58.81	58.24	18.18	58.81	58.24	9.09	58.81	58.24
Cdair	23.17	61.46	61.31	19.86	61.46	61.31	23.17	61.46	61.31
Cvprd	199.02	23.58	23.56	170.59	23.58	23.56	199.02	23.58	23.56
Cgmll	42.31	23.87	23.87	9.4	23.87	23.87	42.31	23.87	23.87
Cpsgr	223.07	27.94	28	15.93	27.94	28	79.67	27.94	28
Cptea	1.23	34.55	34.01	0.15	34.55	34.01	0.15	34.55	34.01

Cfood	157.46	29.7	28.04	13.76	29.7	28.04	288.37	29.7	35.22
Cbeve	41.83	25.2	24.89	1.15	25.2	24.89	140.97	25.2	26.1
Cptob	47.92	25.52	25.48	14.18	25.52	25.48	4.05	25.52	25.48
Ctext	1594.52	27.29	27.09	6.74	27.29	27.09	39.74	27.29	34.8
Cclth	1091.75	24.71	24.59	5.71	24.71	24.59	15.55	24.71	31.48
Cleat	46.38	41.01	37.59	46.38	41.01	37.59	39.75	41.01	53.41
Cwood	251.84	22.29	21.96	71.95	22.29	21.96	35.98	22.29	24.67
Cpapr	582.29	21.11	20.7	45.34	21.11	20.7	98.65	21.11	24.32
Cptrl	8361.06	17.61	17.61						
Cfert	1761.09	20.94	20.95						
Cchem	3935.36	21.22	20.62	211.15	21.22	20.62	857.75	21.22	24.56
Cnmet	124.83	42.01	40.18	107	42.01	40.18	124.83	42.01	45.61
Cmetl	4034.15	18.33	18.08	95.68	18.33	18.08	599.42	18.33	19.49
Cmach	3494.41	15.33	15.24	35.73	15.33	15.24	1696.73	15.33	15.45
Cvehe	3931.49	16.33	16.3	4.52	16.33	16.3	585.27	16.33	16.55
Ceequ	3929.92	20.31	20.31	89.51	20.31	20.31	524.19	20.31	20.93
Coman	421.88	30.72	29.9	3.81	30.72	29.9	63.98	30.72	42.12
Ctrad	29.55	17.88	17.97	25.33	17.88	17.97	29.55	17.88	17.97
Chotl	222.77	21.84	21.91	49.51	21.84	21.91	222.77	21.84	21.91
Ctran	3358.43	19.79	19.84	746.32	19.79	19.84	3358.43	19.79	19.84
Ccomm	253.93	22.65	22.7	0.61	22.65	22.7	48.84	22.65	22.7
Cfsrv	282.41	19.71	19.7	28.24	19.71	19.7	254.17	19.71	19.7
Cbsrv	847.12	17.79	17.81	84.71	17.79	17.81	762.41	17.79	17.81
QMPXY (Quantity of Imports: % change) for Simulation 4									
	Row	row	row	Rowcom	rowcom	rowcom	roweu	roweu	roweu
	INITIAL	BASE(**% Change**)	FTA(**% Change**)	INITIAL	BASE(**% Change**)	FTA(**% Change**)	INITIAL	BASE(**% Change**)	FTA(**% Change**)
Cwhea	35.41	35.35	35.26	0.08	35.35	35.26	42.85	35.35	35.26
Cpuls	3.47	27.54	27.47	0.01	27.54	27.47	4.21	27.54	27.47
Cteal	0.03	40.29	39.57						
Ctoba	0.31	25.32	25.29	0.15	25.32	25.29	0.04	25.32	25.29
Cocrp	3.24	33.42	33.34	2.78	33.42	33.34	3.24	33.42	33.34
Cpoul	2.02	30.94	30.9	1.01	30.94	30.9	2.02	30.94	30.9
Cfish	2.3	28.49	28.45	0.46	28.49	28.45	1.84	28.49	28.45
Ccoal	11.03	9.97	10.12						
Cngas	24.24	23.97	23.93						
Comin	9.09	58.81	58.24	18.18	58.81	58.24	9.09	58.81	58.24
Cdair	23.17	61.46	61.3	19.86	61.46	61.3	23.17	61.46	61.3
Cvprd	199.02	23.58	23.56	170.59	23.58	23.56	199.02	23.58	23.56
Cgmll	42.31	23.87	23.87	9.4	23.87	23.87	42.31	23.87	23.87
Cpsgr	223.07	27.94	28	15.93	27.94	28	79.67	27.94	28

Cptea	1.23	34.55	34.1	0.15	34.55	34.1	0.15	34.55	34.1
Cfood	157.46	29.7	28.02	13.76	29.7	28.02	288.37	29.7	35.21
Cbeve	41.83	25.2	24.87	1.15	25.2	24.87	140.97	25.2	26.08
Cptob	47.92	25.52	25.48	14.18	25.52	25.48	4.05	25.52	25.48
Ctext	1594.52	27.29	27.09	6.74	27.29	27.09	39.74	27.29	34.8
Cclth	1091.75	24.71	24.59	5.71	24.71	24.59	15.55	24.71	31.48
Cleat	46.38	41.01	37.57	46.38	41.01	37.57	39.75	41.01	53.39
cwood	251.84	22.29	21.97	71.95	22.29	21.97	35.98	22.29	24.67
Cpapr	582.29	21.11	20.69	45.34	21.11	20.69	98.65	21.11	24.31
Cptrl	8361.06	17.61	17.61						
Cfert	1761.09	20.94	20.95						
Cchem	3935.36	21.22	20.62	211.15	21.22	20.62	857.75	21.22	24.56
cnmet	124.83	42.01	40.18	107	42.01	40.18	124.83	42.01	45.61
Cmetl	4034.15	18.33	18.09	95.68	18.33	18.09	599.42	18.33	19.5
Cmach	3494.41	15.33	15.24	35.73	15.33	15.24	1696.73	15.33	15.45
Cvehe	3931.49	16.33	16.3	4.52	16.33	16.3	585.27	16.33	16.55
Ceequ	3929.92	20.31	20.31	89.51	20.31	20.31	524.19	20.31	20.93
coman	421.88	30.72	29.86	3.81	30.72	29.86	63.98	30.72	42.07
Ctrad	29.55	17.88	17.97	25.33	17.88	17.97	29.55	17.88	17.97
Chotl	222.77	21.84	21.91	49.51	21.84	21.91	222.77	21.84	21.91
Ctran	3358.43	19.79	19.84	746.32	19.79	19.84	3358.43	19.79	19.84
ccomm	253.93	22.65	22.7	0.61	22.65	22.7	48.84	22.65	22.7
Cfsrv	282.41	19.71	19.7	28.24	19.71	19.7	254.17	19.71	19.7
Cbsrv	847.12	17.79	17.81	84.71	17.79	17.81	762.41	17.79	17.81

Appendix 4 Price of Imports

Price of Imports (PMXPY) for Simulation 1					
	INITIAL (Amount)	Simulation 0 (% Change)	Row FTA(% Change)	Rowcom FTA (% Change)	roweu FTA (% Change)
Cwhea	21.2587	-6.7277	-6.7096	-6.7096	-6.7096
Cpuls	39.5461	-6.723	-6.705	-6.705	-6.705
Cteal	48.8163		-6.9751		
Ctoba	93.7199	-7.0009	-6.9811	-6.9811	-6.9811
Cocrp	26.4784	-6.8944	-6.8753	-6.8753	-6.8753
Cpoul	1.0369	-6.6813	-6.6635	-6.6635	-6.6635
Cfish	0.7159	-7.0016	-6.9818	-6.9818	-6.9818
Ccoal	0.9997		-6.8262		
Cngas	0.9996		-6.8044		
Comin	1.3163	-6.9043	-6.8852	-6.8852	-6.8852
Cmeat	1				
Cdair	1.0577	-6.7017	-6.6838	-6.6838	-6.6838

Cvprd	1.4597	-6.9869	-6.9672	-6.9672	-6.9672
Cgmll	1.1333	-6.7807	-6.7623	-6.7623	-6.7623
Cpsgr	1.5536	-7.0635	-7.0434	-7.0434	-7.0434
Cptea	1.2345	-6.8623	-6.8434	-6.8434	-6.8434
Cfood	1.1554	-6.7889	-6.7705	-6.7705	-9.2827
Cbeve	1.537	-7.0361	-7.0161	-7.0161	-7.7914
Cptob	1.7375	-7.1377	-7.117	-7.117	-7.117
Ctext	1.1539	-6.7896	-6.7712	-6.7712	-6.7712
Cclth	1.4157	-6.9677	-6.9481	-6.9481	-6.9481
Cleat	1.1639	-6.8213	-6.8027	-6.8027	-6.8027
Cwood	1.1309	-6.7682	-6.7499	-6.7499	-7.3497
Cpapr	1.1309	-6.7699	-6.7516	-6.7516	-7.681
Cptrl	0.9999		-6.9482		
Cfert	0.9999		-6.9234		
Cchem	1.2647	-6.883	-6.864	-6.864	-7.7676
Cnmet	1.6478	-7.0741	-7.0539	-7.0539	-8.264
Cmetl	1.3522	-6.9593	-6.9398	-6.9398	-7.3138
Cmach	1.199	-6.8228	-6.8041	-6.8041	-7.1503
Cvehe	1.142	-6.7891	-6.7707	-6.7707	-7.1612
Ceequ	1.1263	-6.8015	-6.783	-6.783	-7.7318
Coman	1.0518	-6.696	-6.6781	-6.6781	-8.8884
Ctrad	0.9992	-6.6421	-6.6246	-6.6246	-6.6246
Chotl	0.9992	-6.6421	-6.6246	-6.6246	-6.6246
Ctran	0.9992	-6.6421	-6.6246	-6.6246	-6.6246
Ccomm	0.9992	-6.6421	-6.6246	-6.6246	-6.6246
Cfsrv	0.9992	-6.6421	-6.6246	-6.6246	-6.6246
Cbsrv	0.9992	-6.6421	-6.6246	-6.6246	-6.6246

Price of Imports (PMXPY) for Simulation 2					
	INITIAL (Amount)	Simulation 0 (% Change)	Row	Rowcom	roweu
			FTA(% Change)	FTA (% Change)	FTA (% Change)
Cwhea	21.2587	-6.7277	-6.7084	-6.7084	-6.7084
Cpuls	39.5461	-6.723	-6.7038	-6.7038	-6.7038
Cteal	48.8163	-6.9948	-6.9734		
Ctoba	93.7199	-7.0009	-6.9794	-6.9794	-6.9794
cocrp	26.4784	-6.8944	-6.8738	-6.8738	-6.8738
cpoul	1.0369	-6.6813	-6.6624	-6.6624	-6.6624
Cfish	0.7159	-7.0016	-6.9802	-6.9802	-6.9802
ccoal	0.9997	-6.845	-6.8248		
cngas	0.9996	-6.8231	-6.803		

comin	1.3163	-6.9043	-6.8837	-6.8837	-6.8837
cmeat	1				
cdair	1.0577	-6.7017	-6.6826	-6.6826	-6.6826
cvprd	1.4597	-6.9869	-6.9656	-6.9656	-6.9656
cgmll	1.1333	-6.7807	-6.761	-6.761	-6.761
cpsgr	1.5536	-7.0635	-7.0416	-7.0416	-7.0416
cptea	1.2345	-6.8623	-6.842	-6.842	-6.842
cfood	1.1554	-6.7889	-6.7692	-6.7692	-9.2814
cbeve	1.537	-7.0361	-7.0144	-7.0144	-7.7896
cptob	1.7375	-7.1377	-7.1151	-7.1151	-7.1151
ctext	1.1539	-6.7896	-6.7698	-6.7698	-6.7698
Cclth	1.4157	-6.9677	-6.9465	-6.9465	-6.9465
Cleat	1.1639	-6.8213	-6.8013	-6.8013	-6.8013
cwood	1.1309	-6.7682	-6.7486	-6.7486	-7.3484
cpapr	1.1309	-6.7699	-6.7503	-6.7503	-7.6797
cptrl	0.9999	-6.9677	-6.9466		
Cfert	0.9999	-6.9428	-6.9218		
cchem	1.2647	-6.883	-6.8625	-6.8625	-7.7661
cnmet	1.6478	-7.0741	-7.0521	-7.0521	-8.2621
cmetl	1.3522	-6.9593	-6.9382	-6.9382	-7.3121
cmach	1.199	-6.8228	-6.8027	-6.8027	-7.1489
cvehe	1.142	-6.7891	-6.7694	-6.7694	-7.1599
ceequ	1.1263	-6.8015	-6.7816	-6.7816	-7.7304
coman	1.0518	-6.696	-6.6769	-6.6769	-8.8872
ctrad	0.9992	-6.6421	-6.6235	-6.6235	-6.6235
chotl	0.9992	-6.6421	-6.6235	-6.6235	-6.6235
ctran	0.9992	-6.6421	-6.6235	-6.6235	-6.6235
ccomm	0.9992	-6.6421	-6.6235	-6.6235	-6.6235
Cfsrv	0.9992	-6.6421	-6.6235	-6.6235	-6.6235
cbsrv	0.9992	-6.6421	-6.6235	-6.6235	-6.6235

Price of Imports (PMXPY) for Simulation Three					
	INITIAL (Amount)	row	Simulation 0 (% Change)	Rowcom	roweu
		FTA (% Change		FTA (% Change)	FTA (% Change)
cwhea	21.2587	-6.7029	-6.7277	-6.7029	-6.7029
cpuls	39.5461	-6.6983	-6.723	-6.6983	-6.6983
Cteal	48.8163	-6.9677			
ctoba	93.7199	-6.9737	-7.0009	-6.9737	-6.9737
cocrp	26.4784	-6.8682	-6.8944	-6.8682	-6.8682
cpoul	1.0369	-6.6569	-6.6813	-6.6569	-6.6569

Cfish	0.7159	-6.9745	-7.0016	-6.9745	-6.9745
ccoal	0.9997	-6.8192			
cngas	0.9996	-6.7975			
comin	1.3163	-6.878	-6.9043	-6.878	-6.878
cmeat	1				
cdair	1.0577	-6.6772	-6.7017	-6.6772	-6.6772
cvprd	1.4597	-6.9599	-6.9869	-6.9599	-6.9599
cgmll	1.1333	-6.7554	-6.7807	-6.7554	-6.7554
cpsgr	1.5536	-7.0358	-7.0635	-7.0358	-7.0358
cptea	1.2345	-6.8364	-6.8623	-6.8364	-6.8364
cfood	1.1554	-6.7636	-6.7889	-6.7636	-9.276
cbeve	1.537	-7.0086	-7.0361	-7.0086	-7.7839
cptob	1.7375	-7.1092	-7.1377	-7.1092	-7.1092
ctext	1.1539	-6.7643	-6.7896	-6.7643	-8.2179
Cclth	1.4157	-6.9408	-6.9677	-6.9408	-8.2853
Cleat	1.1639	-6.7957	-6.8213	-6.7957	-9.2675
cwood	1.1309	-6.7431	-6.7682	-6.7431	-7.3429
cpapr	1.1309	-6.7448	-6.7699	-6.7448	-7.6742
cptrl	0.9999	-6.9409			
Cfert	0.9999	-6.9161			
cchem	1.2647	-6.8569	-6.883	-6.8569	-7.7605
cnmet	1.6478	-7.0463	-7.0741	-7.0463	-8.2563
cmetl	1.3522	-6.9325	-6.9593	-6.9325	-7.3065
cmach	1.199	-6.7972	-6.8228	-6.7972	-7.1433
cvehe	1.142	-6.7638	-6.7891	-6.7638	-7.1544
ceequ	1.1263	-6.7761	-6.8015	-6.7761	-7.7249
coman	1.0518	-6.6715	-6.696	-6.6715	-8.8819
ctrad	0.9992	-6.6181	-6.6421	-6.6181	-6.6181
chotl	0.9992	-6.6181	-6.6421	-6.6181	-6.6181
ctran	0.9992	-6.6181	-6.6421	-6.6181	-6.6181
ccomm	0.9992	-6.6181	-6.6421	-6.6181	-6.6181
Cfsrv	0.9992	-6.6181	-6.6421	-6.6181	-6.6181
cbsrv	0.9992	-6.6181	-6.6421	-6.6181	-6.6181

Price of Imports (PMXPY) for Simulation 4					
	INITIAL (Amount)	Simulation 0 (% Change)	Row	Rowcom	roweu
			FTA (% Change)	FTA (% Change)	FTA (% Change)
cwhea	21.2587	-6.7277	-6.7012	-6.7012	-6.7012
cpuls	39.5461	-6.723	-6.6966	-6.6966	-6.6966
Cteal	48.8163		-6.9656		
ctoba	93.7199	-7.0009	-6.9716	-6.9716	-6.9716
cocrp	26.4784	-6.8944	-6.8663	-6.8663	-6.8663
cpoul	1.0369	-6.6813	-6.6553	-6.6553	-6.6553
Cfish	0.7159	-7.0016	-6.9724	-6.9724	-6.9724
ccoal	0.9997		-6.8173		
cngas	0.9996		-6.7957		
comin	1.3163	-6.9043	-6.8761	-6.8761	-6.8761
cmeat	1				
cdair	1.0577	-6.7017	-6.6755	-6.6755	-6.6755
cvprd	1.4597	-6.9869	-6.9578	-6.9578	-6.9578
cgmll	1.1333	-6.7807	-6.7537	-6.7537	-6.7537
cpsgr	1.5536	-7.0635	-7.0336	-7.0336	-7.0336
cptea	1.2345	-6.8623	-6.8345	-6.8345	-6.8345
cfood	1.1554	-6.7889	-6.7618	-6.7618	-9.2742
cbeve	1.537	-7.0361	-7.0065	-7.0065	-7.7817
cptob	1.7375	-7.1377	-7.107	-7.107	-7.107
ctext	1.1539	-6.7896	-6.7625	-6.7625	-8.2162
Cclth	1.4157	-6.9677	-6.9388	-6.9388	-8.2832
Cleat	1.1639	-6.8213	-6.7939	-6.7939	-9.2656
cwood	1.1309	-6.7682	-6.7413	-6.7413	-7.3411
cpapr	1.1309	-6.7699	-6.7431	-6.7431	-7.6724
cptrl	0.9999		-6.9388		
Cfert	0.9999		-6.9141		
cchem	1.2647	-6.883	-6.855	-6.855	-7.7586
cnmet	1.6478	-7.0741	-7.0441	-7.0441	-8.2541
cmetl	1.3522	-6.9593	-6.9305	-6.9305	-7.3044
cmach	1.199	-6.8228	-6.7954	-6.7954	-7.1415
cvehe	1.142	-6.7891	-6.7621	-6.7621	-7.1526
ceequ	1.1263	-6.8015	-6.7743	-6.7743	-7.7231
coman	1.0518	-6.696	-6.6698	-6.6698	-8.8803
ctrad	0.9992	-6.6421	-6.6165	-6.6165	-6.6165
chotl	0.9992	-6.6421	-6.6165	-6.6165	-6.6165
ctran	0.9992	-6.6421	-6.6165	-6.6165	-6.6165
ccomm	0.9992	-6.6421	-6.6165	-6.6165	-6.6165
Cfsrv	0.9992	-6.6421	-6.6165	-6.6165	-6.6165

cbsrv	0.9992	-6.6421	-6.6165	-6.6165	-6.6165

Appendix 45Average output price (PXXPY)

Average Output Price (PXXPY)						
	INITIAL Amount	Simulation 0 (% Change)	Simulation 1 (% Change)	Simulation 2 (% Change)	Simulation 3 (% Change)	Simulation 4 (% Change)
Cteff	22.8936	-5.4582	-5.45568	-5.45547	-5.45493	-5.45468
cbarl	20.10863	-6.01272	-6.01054	-6.01036	-6.00984	-6.00963
cwhea	19.59441	-4.86819	-4.86443	-4.86412	-4.8632	-4.86282
cmaiz	13.85003	-4.03679	-4.03316	-4.03296	-4.03248	-4.03224
csorg	9.660325	-3.44722	-3.44408	-3.44394	-3.44367	-3.44352
Cpuls	36.63593	-4.83748	-4.83471	-4.83456	-4.83424	-4.83407
Coils	24.42485	-5.04154	-5.03005	-5.02904	-5.02539	-5.02395
Cvege	17.84196	-3.78718	-3.78415	-3.784	-3.78374	-3.78357
Cfrui	6.191016	-3.77815	-3.77505	-3.77487	-3.77464	-3.77444
Cnset	90.07683	3.690946	3.686925	3.686908	3.685814	3.685699
Ccott	66.4701	-0.92814	-0.93403	-0.93178	-0.94576	-0.94214
Csugr	2.555506	4.925233	5.02304	5.029358	5.0257	5.032411
Cteal	34.41827	43.98022	42.26773	42.56049	42.2627	42.55608
Cchat	183.0267	6.454665	6.452911	6.451641	6.451492	6.450047
Ctoba	62.98391	-1.65358	-1.64275	-1.63966	-1.63821	-1.63437
Ccoff	271.7947	-2.6597	-2.65422	-2.65341	-2.65252	-2.65155
Cflow	144.8532	-5.73095	-5.71658	-5.7159	-5.71098	-5.70989
Cocrp	20.57017	-2.86012	-2.85577	-2.85545	-2.85473	-2.85435
Ccatt	1.001432	3.667599	3.675755	3.675747	3.66036	3.66048
Cmilk	1.001437	3.63468	3.642665	3.642606	3.627654	3.627756
Cpoul	1.001444	3.68905	3.69714	3.697061	3.681771	3.681825
Caprd	1.001313	3.570537	3.57794	3.578088	3.555512	3.554605
Cfish	0.998574	-1.49218	-1.48298	-1.48309	-1.47896	-1.47893
Cfore	1.001696	11.18383	11.19129	11.19059	11.19306	11.19223
Comin	0.997654	36.27959	35.8562	35.85747	35.77936	35.78119
Cdair	1.001457	3.469697	3.477967	3.477875	3.463488	3.463578
Cvprd	1.001107	0.34206	0.083165	0.127295	0.086375	0.130322
Cgmll	1.000535	-5.10758	-5.09355	-5.0927	-5.08849	-5.08739
Cmsrv	1.001646	0.689447	0.712381	0.706816	0.719764	0.713212
Cpsgr	1.002056	-1.19779	-1.16283	-1.16079	-1.16005	-1.15785
Cptea	1.001185	-0.39317	-0.67047	-0.62134	-0.66776	-0.6186
cfood	1.000976	-0.48519	-1.13202	-1.13735	-1.12953	-1.13483
cbeve	1.002228	-2.92924	-3.38255	-3.42288	-3.37523	-3.41595
cptob	1.001277	-2.06112	-2.0441	-2.05043	-2.0396	-2.04692
Ctext	1.000428	-2.98015	-2.96868	-2.96926	-2.99144	-2.99281
Cclth	1.000906	-3.02313	-3.00679	-3.00813	-3.0443	-3.04527

Cleat	1.000074	-0.76437	-0.77316	-0.77229	-0.99428	-1.00362
cwood	1.000066	-3.01223	-3.05093	-3.05367	-3.04561	-3.04821
cpapr	0.999949	-5.54484	-5.64707	-5.64857	-5.64015	-5.64141
cchem	0.999694	-3.78958	-3.95034	-3.94809	-3.95857	-3.95573
cnmet	1.000327	12.74677	12.42527	12.42513	12.37541	12.3757
cmetl	0.999531	-6.76888	-6.81125	-6.80813	-6.80532	-6.8019
cmach	1.000153	-3.68568	-3.82373	-3.83285	-3.82581	-3.83524
cvehe	0.999876	-6.25686	-6.28726	-6.28811	-6.28069	-6.28164
ceequ	0.999743	-5.74852	-5.8149	-5.81072	-5.80987	-5.80591
coman	1.000337	-5.42437	-5.51349	-5.52707	-5.50622	-5.51978
Celec	1.002081	1.949747	1.980587	1.979847	1.989376	1.987345
cwatr	1.001902	2.874559	2.884131	2.881074	2.891089	2.887335
ccons	1.000402	2.928641	2.749238	2.748664	2.724687	2.724047
ctrad	1.001432	-7.76513	-7.74024	-7.73728	-7.73086	-7.7276
chotl	1.00261	-4.21298	-4.29415	-4.29784	-4.2928	-4.29657
ctran	1.000348	-5.0976	-5.06773	-5.0665	-5.05882	-5.05744
ccomm	1.001252	-3.52568	-3.49264	-3.4925	-3.4819	-3.48185
Cfsrv	1.001615	-7.06314	-7.05939	-7.06051	-7.05552	-7.05733
cbsrv	0.999969	-7.93207	-7.9148	-7.91371	-7.90838	-7.90684
creal	1.002219	-7.94268	-7.9585	-7.9591	-7.95889	-7.9599
cosrv	1.001424	-9.32494	-9.31779	-9.31999	-9.31458	-9.31709
cpadm	1.001565	-10.2827	-10.3285	-10.3292	-10.3288	-10.3294
ceduc	1.002148	-14.3735	-14.4225	-14.4134	-14.4215	-14.4124
cheal	1.001875	-8.49922	-8.51556	-8.51454	-8.5115	-8.51079

Appendix 6 Sectoral Impacts

	Sectors	base	Simulation 1	Simulation 2	Simulation 3	Simulation 4
Pexpy (Price of exports)	agriculture	-6.21214	-6.19716	-6.19672	-6.19167	-6.19068
	industry	-5.88765	-5.8744	-5.87438	-5.86955	-5.86897
	service	-6.6421	-6.6246	-6.6235	-6.6181	-6.6165
Pddxpy (Domestic demand price)	agriculture	1.702781	1.614531	1.626188	1.611031	1.622813
	industry	-2.51606	-2.599	-2.60176	-2.61459	-2.61818
	service	-13.3891	-13.4029	-13.4021	-13.401	-13.4002
Pqxpy (Price of composite commodity)	agriculture	0.652	0.570434	0.58035	0.568144	0.578202
	industry	-4.4	-4.47784	-4.47909	-4.51414	-4.51543
	service	-7.77	-7.78315	-7.7825	-7.77882	-7.77823
Pvaxpy(value added price)	agriculture	0.114	0.080918	0.081621	0.077894	0.078661
	industry	-3.34	-3.46591	-3.47836	-3.55896	-3.57721
	service	-10.5	-10.3789	-10.3764	-10.3718	-10.3695
Pxxpy(average output price)	agriculture	1.931	1.836502	1.848786	1.832623	1.845018
	industry	-1.85	-1.94324	-1.94738	-1.96097	-1.96588
	service	-7.82	-7.82835	-7.82769	-7.82396	-7.82339
Qqxpy(composite goods supply)	agriculture	17.64104	17.66812	17.66781	17.66417	17.66386
	industry	19.2657	19.30214	19.304	19.3393	19.34126
	Service	18.56155	18.59325	18.59359	18.59322	18.59358
Qdxpy (quantity of domestic sales)	agriculture	16.55281	16.5625	16.56125	16.55875	16.5575
	industry	14.27471	14.25647	14.26294	14.16882	14.17529
	service	21.28182	21.31818	21.31727	21.32	21.32091

Appendix 7 CGE Model Specification

Table A1. CGE model sets, parameters, and variables

Symbol	Explanation	Symbol	Explanation
Sets			
$a \in A$	Activities	$c \in CMN(\subset C)$	Commodities not in *CM*
$a \in ALEO(\subset A)$	Activities with a Leontief function at the top of the technology nest	$c \in CT(\subset C)$	Transaction service commodities
$c \in C$	Commodities	$c \in CX(\subset C)$	Commodities with domestic production
$c \in CD(\subset C)$	Commodities with domestic sales of domestic output	$f \in F$	Factors
$c \in CDN(\subset C)$	Commodities not in *CD*	$i \in INS$	Institutions (domestic and rest of world)
$c \in CE(\subset C)$	Exported commodities	$i \in INSD(\subset INS)$	Domestic institutions
$c \in CEN(\subset C)$	Commodities not in *CE*	$i \in INSDNG(\subset INSD)$	Domestic non-government institutions
$c \in CM(\subset C)$	Aggregate imported commodities	$h \in H(\subset INSDNG)$	Households
Parameters			
$cwts_c$	Weight of commodity c in the CPI	$qdst_c$	Quantity of stock change
$dwts_c$	Weight of commodity c in the producer price index	$\overline{qg}_c$	Base-year quantity of government demand
ica_{ca}	Quantity of c as intermediate input per unit of activity a	$\overline{qinv}_c$	Base-year quantity of private investment demand
$icd_{cc'}$	Quantity of commodity c as trade input per unit of c' produced and sold domestically	$shif_{if}$	Share for domestic institution i in income of factor f
$ice_{cc'}$	Quantity of commodity c as trade input per exported unit of c'	$shii_{ii'}$	Share of net income of i' to i (i' ∈ INSDNG'; i ∈ INSDNG)
$icm_{cc'}$	Quantity of commodity c as trade input per imported unit of c'	ta_a	Tax rate for activity a
$inta_a$	Quantity of aggregate intermediate input per activity unit	$\overline{tins}_i$	Exogenous direct tax rate for domestic institution i
iva_a	Quantity of aggregate intermediate input per activity unit	$tins01_i$	0-1 parameter with 1 for institutions with potentially flexed direct tax rates
$\overline{mps}_i$	Base savings rate for domestic institution i	tm_c	Import tariff rate
$mps01_i$	0-1 parameter with 1 for institutions with potentially flexed direct tax rates	tq_c	Rate of sales tax
pwe_c	Export price (foreign currency)	$trnsfr_{i,f}$	Transfer from factor f to institution i
pwm_c	Import price (foreign currency)		

Table A1 continued. CGE model sets, parameters, and variables

Symbol	Explanation	Symbol	Explanation
Greek Symbols			
α_a^a	Efficiency parameter in the CES activity function	δ_{cr}^t	CET function share parameter
α_a^{va}	Efficiency parameter in the CES value-added function	δ_{fa}^{va}	CES value-added function share parameter for factor *f* in activity *a*
α_c^{ac}	Shift parameter for domestic commodity aggregation function	γ_{ch}^m	Subsistence consumption of marketed commodity c for household h
α_c^q	Armington function shift parameter	θ_{ac}	Yield of output c per unit of activity a
α_c^t	CET function shift parameter	ρ_a^a	CES production function exponent
β^a	Capital sectoral mobility factor	ρ_a^{va}	CES value-added function exponent
β_{ch}^m	Marginal share of consumption spending on marketed commodity c for household h	ρ_c^{ac}	Domestic commodity aggregation function exponent
δ_a^a	CES activity function share parameter	ρ_c^q	Armington function exponent
δ_{ac}^{ac}	Share parameter for domestic commodity aggregation function	ρ_c^t	CET function exponent
δ_{cr}^q	Armington function share parameter	η_{fat}^a	Sector share of new capital
υ_f	Capital depreciation rate	QF_{fa}	Quantity demanded of factor f
Exogenous Variables			
$\overline{CPI}$	Consumer price index	$\overline{MPSADJ}$	Savings rate scaling factor (= 0 for base)
$\overline{DTINS}$	Change in domestic institution tax share (= 0 for base; exogenous variable)	$\overline{QFS}_f$	Quantity supplied of factor
$\overline{FSAV}$	Foreign savings (FCU)	$\overline{TINSADJ}$	Direct tax scaling factor (= 0 for base; exogenous variable)
$\overline{GADJ}$	Government consumption adjustment	$\overline{WFDIST}_{fa}$	Wage distortion factor for factor f in activity a
$\overline{IADJ}$	Investment adjustment factor		
Endogenous Variables			
AWF_{ft}^a	Average capital rental rate in time period t	QG_c	Government consumption demand for commodity
$DMPS$	Change in domestic institution savings rates (= 0 for base; exogenous variable)	QH_{ch}	Quantity consumed of commodity c by household h
DPI	Producer price index for domestically marketed output	QHA_{ach}	Quantity of household home consumption of commodity c from activity a for household h
EG	Government expenditures	$QINTA_a$	Quantity of aggregate intermediate input
EH_h	Consumption spending for household	$QINT_{ca}$	Quantity of commodity c as intermediate input to activity a
EXR	Exchange rate (LCU per unit of FCU)	$QINV_c$	Quantity of investment demand for commodity
$GSAV$	Government savings	QM_{cr}	Quantity of imports of commodity c

Table A1 continued. CGE model sets, parameters, and variables

Symbol	Explanation	Symbol	Explanation
Endogenous Variables Continued			
MPS_i	Marginal propensity to save for domestic non-government institution (exogenous variable)	QQ_c	Quantity of goods supplied to domestic market (composite supply)
PA_a	Activity price (unit gross revenue)	QT_c	Quantity of commodity demanded as trade input
PDD_c	Demand price for commodity produced and sold domestically	QVA_a	Quantity of (aggregate) value-added
PDS_c	Supply price for commodity produced and sold domestically	QX_c	Aggregated quantity of domestic output of commodity
PE_{cr}	Export price (domestic currency)	$QXAC_{ac}$	Quantity of output of commodity c from activity a
$PINTA_a$	Aggregate intermediate input price for activity a	RWF_f	Real average factor price
PK_{ft}	Unit price of capital in time period t	$TABS$	Total nominal absorption
PM_{cr}	Import price (domestic currency)	$TINS_i$	Direct tax rate for institution i (i ∈ INSDNG)
PQ_c	Composite commodity price	$TRII_{ii'}$	Transfers from institution i' to i (both in the set INSDNG)
PVA_a	Value-added price (factor income per unit of activity)	WF_f	Average price of factor
PX_c	Aggregate producer price for commodity	YF_f	Income of factor f
$PXAC_{ac}$	Producer price of commodity c for activity a	YG	Government revenue
QA_a	Quantity (level) of activity	YI_i	Income of domestic non-government institution
QD_c	Quantity sold domestically of domestic output	YIF_{if}	Income to domestic institution i from factor f
QE_{cr}	Quantity of exports	ΔK^a_{fat}	Quantity of new capital by activity a for time period t

Table A2. CGE model equations

Production and Price Equations

$$QINT_{ca} = ica_{ca} \cdot QINTA_a \quad (1)$$

$$PINTA_a = \sum_{c \in C} PQ_c \cdot ica_{ca} \quad (2)$$

$$QVA_a = \alpha_a^{va} \cdot \left(\sum_{f \in F} \delta_{fa}^{va} \cdot \alpha_{fa}^{vaf} \cdot QF_{fa}^{-\rho_a^{va}} \right)^{-\frac{1}{\rho_a^{va}}} \quad (3)$$

$$W_f \cdot \overline{WFDIST}_{fa} = PVA_a \cdot QVA_a \cdot \left(\sum_{f \in F'} \delta_{fa}^{va} \cdot \alpha_{fa}^{vaf} \cdot QF_{fa}^{-\rho_a^{va}} \right)^{-1} \cdot \delta_{fa}^{va} \cdot \alpha_{fa}^{vaf} \cdot QF_{fa}^{-\rho_a^{va}-1} \quad (4)$$

$$QF_{fa} = \alpha_{fa}^{van} \cdot \left(\sum_{f' \in F} \delta_{ff'a}^{van} \cdot QF_{f'a}^{-\rho_{fa}^{van}} \right)^{-\frac{1}{\rho_{fa}^{van}}} \quad (5)$$

$$W_{f'} \cdot WFDIST_{f'a} = W_f \cdot WFDIST_{fa} \cdot QF_{fa} \cdot \left(\sum_{f'' \in F} \delta_{ff''a}^{van} \cdot QF_{f''a}^{-\rho_{fa}^{van}} \right)^{-1} \cdot \delta_{ff'a}^{van} \cdot QF_{f'a}^{-\rho_{fa}^{van}-1} \quad (6)$$

$$QVA_a = iva_a \cdot QA_a \quad (7)$$

$$QINTA_a = inta_a \cdot QA_a \quad (8)$$

$$PA_a \cdot (1 - ta_a) \cdot QA_a = PVA_a \cdot QVA_a + PINTA_a \cdot QINTA_a \quad (9)$$

$$QXAC_{ac} = \theta_{ac} \cdot QA_a \quad (10)$$

$$PA_a = \sum_{c \in C} PXAC_{ac} \cdot \theta_{ac} \quad (11)$$

$$QX_c = \alpha_c^{ac} \cdot \left(\sum_{a \in A} \delta_{ac}^{ac} \cdot QXAC_{ac}^{-\rho_c^{ac}} \right)^{-\frac{1}{\rho_c^{ac}-1}} \quad (12)$$

$$PXAC_{ac} = PX_c \cdot QX_c \left(\sum_{a \in A'} \delta_{ac}^{ac} \cdot QXAC_{ac}^{-\rho_c^{ac}} \right)^{-1} \cdot \delta_{ac}^{ac} \cdot QXAC_{ac}^{-\rho_c^{ac}-1} \quad (13)$$

$$PE_{cr} = pwe_{cr} \cdot EXR - \sum_{c' \in CT} PQ_c \cdot ice_{c'c} \quad (14)$$

$$QX_c = \alpha_c^t \cdot \left(\sum_r \delta_{cr}^t \cdot QE_{cr}^{\rho_c^t} + (1 - \sum_r \delta_{cr}^t) \cdot QD_c^{\rho_c^t} \right)^{\frac{1}{\rho_c^t}} \quad (15)$$

$$\frac{QE_{cr}}{QD_c} = \left(\frac{PE_{cr}}{PDS_c} \cdot \frac{1 - \sum_r \delta_{cr}^t}{\delta_c^t} \right)^{\frac{1}{\rho_c^t - 1}} \quad (16)$$

Table A3. CGE model equations (continued)

$$QX_c = QD_c + \sum_r QE_{cr} \quad (17)$$

$$PX_c \cdot QX_c = PDS_c \cdot QD_c + \sum_r PE_{cr} \cdot QE_{cr} \quad (18)$$

$$PDD_c = PDS_c + \sum_{c' \in CT} PQ_{c'} \cdot icd_{c'c} \quad (19)$$

$$PM_{cr} = pwm_{cr} \cdot (1 + tm_{cr}) \cdot EXR + \sum_{c' \in CT} PQ_{c'} \cdot icm_{c'c} \quad (20)$$

$$QQ_c = \alpha_c^q \cdot \left(\sum_r \delta_{cr}^q \cdot QM_{cr}^{-\rho_c^q} + (1 - \sum_r \delta_{cr}^q) \cdot QD_c^{-\rho_c^q} \right)^{\frac{1}{\rho_c^q}} \quad (21)$$

$$\frac{QM_{cr}}{QD_c} = \left(\frac{PDD_c}{PM_c} \cdot \frac{\delta_c^q}{1 - \sum_r \delta_{cr}^q} \right)^{\frac{1}{1+\rho_c^q}} \quad (22)$$

$$QQ_c = QD_c + \sum_r QM_{cr} \quad (23)$$

$$PQ_c \cdot (1 - tq_c) \cdot QQ_c = PDD_c \cdot QD_c + \sum_r PM_{cr} \cdot QM_{cr} \quad (24)$$

$$QT_c = \sum_{c' \in C'} icm_{cc'} \cdot QM_{c'} + ice_{cc'} \cdot QE_{c'} + icd_{cc'} \cdot QD_{c'} \quad (25)$$

$$\overline{CPI} = \sum_{c \in C} PQ_c \cdot cwts_c \quad (26)$$

$$DPI = \sum_{c \in C} PDS_c \cdot dwts_c \quad (27)$$

Institutional Incomes and Domestic Demand Equations

$$YF_f = \sum_{a \in A} WF_f \cdot \overline{WFDIST}_{fa} \cdot QF_{fa} \quad (28)$$

$$YIF_{if} = shif_{if} \cdot \left[YF_f - trnsfr_{row\,f} \cdot EXR \right] \quad (29)$$

$$YI_i = \sum_{f \in F} YIF_{if} + \sum_{i' \in INSDNG'} TRII_{ii'} + trnsfr_{i\,gov} \cdot \overline{CPI} + trnsfr_{i\,row} \cdot EXR \quad (30)$$

$$TRII_{ii'} = shii_{ii'} \cdot (1 - MPS_{i'}) \cdot (1 - \overline{tins}_{i'}) \cdot YI_{i'} \quad (31)$$

$$EH_h = \left(1 - \sum_{i \in INSDNG} shii_{ih} \right) \cdot (1 - MPS_h) \cdot (1 - \overline{tins}_h) \cdot YI_h \quad (32)$$

$$PQ_c \cdot QH_{ch} = PQ_c \cdot \gamma_{ch}^m + \beta_{ch}^m \cdot \left(EH_h - \sum_{c' \in C} PQ_{c'} \cdot \gamma_{c'h}^m \right) \quad (33)$$

$$QINV_c = IADJ \cdot \overline{qinv}_c \quad (34)$$

$$QG_c = \overline{GADJ} \cdot \overline{qg}_c \quad (35)$$

Table A3. CGE Model Equations (continued)

$$EG = \sum_{c \in C} PQ_c \cdot QG_c + \sum_{i \in INSDNG} trnsfr_{i\,gov} \cdot \overline{CPI} \tag{36}$$

System Constraints and Macroeconomic Closures

$$YG = \sum_{i \in INSDNG} \overline{tins_i} \cdot YI_i + \sum_{c \in CMNR} tm_c \cdot pwm_c \cdot QM_c \cdot EXR + \sum_{c \in C} tq_c \cdot PQ_c \cdot QQ_c + \sum_{f \in F} YF_{gov\,f} + trnsfr_{gov\,row} \cdot EXR \tag{37}$$

$$QQ_c = \sum_{a \in A} QINT_{c\,a} + \sum_{h \in H} QH_{c\,h} + QG_c + QINV_c + qdst_c + QT_c \tag{38}$$

$$\sum_{a \in A} QF_{f\,a} = QFS_f \tag{39}$$

$$YG = EG + GSAV \tag{40}$$

$$\sum_{r\,c \in CMNR} pwm_{cr} \cdot QM_{cr} + \sum_{f \in F} trnsfr_{row\,f} = \sum_{r\,c \in CENR} pwe_{cr} \cdot QE_{cr} + \sum_{i \in INSD} trnsfr_{i\,row} + FSAV \tag{41}$$

$$\sum_{i \in INSDNG} MPS_i \cdot \left(1 - \overline{tins_i}\right) \cdot YI_i + GSAV + EXR \cdot FSAV = \sum_{c \in C} PQ_c \cdot QINV_c + \sum_{c \in C} PQ_c \cdot qdst_c \tag{42}$$

$$MPS_i = \overline{mps_i} \cdot \left(1 + MPSADJ\right) \tag{43}$$

Capital Accumulation and Allocation Equations

$$AWF_{f\,t}^{a} = \sum_{a} \left[\left(\frac{QF_{f\,a\,t}}{\sum_{a'} QF_{f\,a'\,t}} \right) \cdot WF_{f\,t} \cdot WFDIST_{f\,a\,t} \right] \tag{44}$$

$$\eta_{f\,a\,t}^{a} = \left(\frac{QF_{f\,a\,t}}{\sum_{a'} QF_{f\,a'\,t}} \right) \cdot \left(\beta^{a} \cdot \left(\frac{WF_{f,t} \cdot WFDIST_{f\,a\,t}}{AWF_{f\,t}^{a}} - 1 \right) + 1 \right) \tag{45}$$

$$\Delta K_{f\,a\,t}^{a} = \eta_{f\,a\,t}^{a} \cdot \left(\frac{\sum_{c} PQ_{c\,t} \cdot QINV_{c\,t}}{PK_{f\,t}} \right) \tag{46}$$

$$PK_{f\,t} = \sum_{c} PQ_{c\,t} \cdot \frac{QINV_{c\,t}}{\sum_{c'} QINV_{c'\,t}} \tag{47}$$

$$QF_{f\,a\,t+1} = QF_{f\,a\,t} \cdot \left(1 + \frac{\Delta K_{f\,a\,t}^{a}}{QF_{f\,a\,t}} - \upsilon_f \right) \tag{48}$$

$$QFS_{f\,t+1} = QFS_{f\,t} \cdot \left(1 + \frac{\sum_{a} \Delta K_{f\,a\,t}}{QFS_{f\,t}} - \upsilon_f \right) \tag{49}$$

Table Activity Accounts

Sector	Code	Description	ISIC
		Industry	
15	**amining**	Mining and quarrying	1010-1429
16	**aofood**	Production, processing and preserving of meat and meat products	1511
		Production and preserving of fish and fish products	1512
		Processing and preserving of fruit and vegetables	1513
		Manufacture of vegetables and animal oils and fats	1514
		Manufacture of prepared animal feeds	1533
		Manufacture of bakery products	1541
		Manufacture of macaroni, noodles, couscous and similar farinaceous products	1544
		Manufacture of other food products n.e.c.	1549
17	**adairy**	Manufacture of dairy products	1520
18	**agmill**	Manufacture of grain mill products	1531
19	**agmillserv**	Manufacture of grain mill services	1532
20	**asug**	Manufacture of sugar	1542
		Manufacture of cocoa, chocolate and sugar confectionery	1543
21	**abev**	Distilling, rectifying and blending of spirits; ethyl talc production from fermented materials	1551
		Manufacture of wines	1552
		Manufacture of malt liquors and malt	1553
		Manufacture of soft drinks; production of mineral waters	1554
22	**amtob**	Manufacture of tobacco products	1600
23	**atext**	Preparation and spinning of textile fibers; weaving of textiles	1711
		Finishing of textiles	1712
		Manufacture of made-up textile articles, except apparel	1721
		Manufacture of carpets and rugs	1722
		Manufacture of cordage, rope, twine and netting	1723
		Manufacture of other textiles n.e.c.	1729
		Manufacture of knitted and crocheted fabrics and articles	1730
24	**aapar**	Manufacture of wearing apparel except fur apparel	1810
25	**aleath**	Tanning and dressing of leather	1911
		Manufacture of luggage handbags and the like, saddler and harness	1912
		Manufacture of footwear	1920
26	**awood**	Wood and wood products	20
27	**apaperp**	Manufacture of paper and paper products; publishing; printing	21,22
28	**achem**	Manufacture of chemicals, rubber and plastic products	24, 25
29	**aminprod**	Manufacture of mineral products	26
30	**abmetalp**	Manufacture of basic iron and steel	2710
		Manufacture of metal products	28
31	**amach**	Manufacture of ovens, furnaces and furnace burners	2914
		Manufacture of machinery for food, beverage and tobacco processing	2925
32	**aelecq**	Manufacture of office, accounting and computing machinery	3000
		Manufacture of accumulators, primary cells and primary batteries	3140
33	**aveh**	Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers	3420
		Manufacture of parts and accessories for motor vehicles and their engines	3430
34	**aomanu**	Manufacture of furniture	3610
		Manufacture of jewelry and related articles	3691

Continued…

Sector	Code	Description	ISIC
		Agriculture	
1	**atef 1-5**	Growing of Teff	in 011
2	**abar 1-5**	Growing of Barley	in 011
3	**awhea 1-5**	Growing of Wheat	in 011
4	**amaiz 1-5**	Growing of Maize	in 011
5	**asorg 1-5**	Growing of Sorghum	in 011
6	**apul 1-5**	Growing of Pulses	in 011
7	**avegfr 1-5**	Growing of Vegetables and Fruits nec	in 011
8	**aoils 1-5**	Growing of Oil seeds	in 011
9	**acash 1-5**	Growing of Cash crops nec: Sugar cane and beet, tea, chat, plant-based fibers, cotton	in 011
10	**aenset 1-5**	Growing of Enset	in 011
11	**acrop 1-5**	Growing of crops nec	in 011
12	**acoff 1-5**	Growing of Coffee	in 011
13	**alivst 1-5**	Livestock farming, dairy farming, production of animal products	0121,0122
14	**afisfor**	Forestry and fishing	
		Services	
35	**aelect**	Electricity, gas, steam and hot-water supply	40
36	**afwater**	Activity of collecting(fetching) free water-(own consumption by HH)	41
37	**awater**	Collection purification and distribution of Water	41
38	**acons**	Construction	45
39	**atrad**	Wholesale and retail trade; repair of Motor vehicles, motorcycles and personal and household goods.	50,51,52
40	**ahotel**	Hotels and Restaurants	55
41	**atrncom**	Transport, Storage and communications	60-64
42	**afserv**	Financial intermediation	65,66,67
43	**arest**	Real Estate, Renting and Business Activities	70,71
44	**apadmin**	Public administration	75
45	**aeduc**	Education	80
46	**aheal**	Health and Social Work	85
47	**aoserv**	Business Activities	72,73,74
		Other Community, Social and Personal Service activities	90-93
		Private Households with Employed Persons	95

Table Commodity Accounts

No.	Code	Description
		Agricultural Marketed Commodities
1	**ctef**	Teff
2	**cbar**	Barley
3	**cwhea**	Wheat
4	**cmaiz**	Maize
5	**Csorg**	Sorghum
6	**cpul**	Pulses
7	**cveg**	Vegetables nec
8	**coils**	Oil seeds
9	**ccotts**	Cotton Seed
10	**ccane**	Sugar cane sugar beet
11	**cfruit**	Fruit Crops
12	**ctea**	Tea
13	**cchat**	Chat
14	**ccoff**	Coffee
15	**Censet**	Enset
16	**ccrop**	Cereal grains and other crops nec
17	**cfibre**	Plant-based fibers
18	**ccatt**	Cattle
19	**cpoul**	Poultry; Other small livestock
20	**cmilk**	Raw milk
21	**ccott**	Raw cotton, Wool, silk-worm cocoons
22	**caprod**	Animal products nec
23	**cfors**	Forestry products
24	**cflower**	Flowers
25	**cfish**	Fish
		Marketed Services
56	**celect**	Electricity
57	**cwater**	Water
58	**ccons**	Construction
59	**ctrad**	Trade and repair services
60	**chotel**	Hotels and restaurants
61	**ctrans**	Transport services
62	**ccomm**	Communication
63	**cfserv**	Financial services
64	**cbserv**	Business services nec
65	**cpadmin**	Public administration and defense
66	**ceduc**	Education
67	**cheal**	Health
68	**coserv**	Recreation and other services
69	**crest**	Real estate and renting services

continued….

No.	Code	Description
		Marketed Industrial Commodities
26	**ccoal**	Coal
27	**cngas**	Gas
28	**cmin**	Minerals nec
29	**cmeat**	Meat products
30	**cvprod**	Vegetable products; animal oils and fats
31	**cdairy**	Dairy products
32	**csug**	Sugar and sugar confectionary
33	**cgmill**	Grain mill products
34	**cgmillserv**	Grain mill services
35	**cfood**	Food products nec; animal feeds
36	**cbev**	Beverages
37	**ctob**	Tobacco Products
38	**cmtea**	Manufacturing of tea
39	**cmtob**	Manufacturing of tobacco
40	**clcott**	Lintel Cotton
41	**ctext**	Textiles
42	**capar**	Wearing apparel
43	**cleath**	Leather products
44	**cwood**	Wood products
45	**cpaper**	Paper products publishing
46	**coilptrl**	Petroleum coal products
47	**cfert**	Fertilizers
48	**cchem**	Chemicals, rubber and plastic products
49	**cminprod**	Mineral products nec
50	**cmetal**	Metals nec
51	**cmprod**	Metal products
52	**cveh**	Motor vehicles and parts; other transport equipment
53	**celecq**	Electronic equipment
54	**cmach**	Machinery and equipment nec
55	**comanu**	Manufactures nec

Continued…

No.	Code	Description
		Own-Consumed Agricultural Commodities
70	**ctefo**	Teff
71	**cbaro**	Barley
72	**cwheao**	Wheat
73	**cmaizo**	Maize
74	**cpulo**	Pulses
75	**cvego**	Vegetables nec
76	**coilso**	Oil seeds
77	**ccaneo**	Sugar cane sugar beet
78	**cfruito**	Fruit Crops
79	**cchato**	Chat
80	**ccoffo**	Coffee
81	**ccropo**	Cereal grains and other crops nec
82	**cpoulo**	Poultry; Other small livestock
83	**cmilko**	Raw milk
84	**ccotto**	Raw cotton, Wool, silk-worm cocoons
		Own-Consumed Processed Commodities
85	**caprodo**	Animal products nec
86	**cforso**	Forestry products
87	**cfisho**	Fish
88	**cmeato**	Meat products
89	**cdairyo**	Dairy products
		Own-Consumed Services
90	**cfwatero**	Water collection
91	**cresto**	Housing

DECLARATION

I, the undersigned, declare that this thesis is my original work and has not been presented for a degree in any other university, and that all sorts of materials used for this thesis have been duly acknowledged.

Declared by:

Name: _____

Signature: _____

Date: _____

Confirmed by advisor:

Name: _____

Signature: _____

Date: _____

Place and date of submission_____